THE IRON TRADE REVIEW

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THE WEEK IN IRON CIRCLES.

THE MARKET AT LARGE.

The expectation is that a round lot of Bessemer iron for delivery in the second half of the year will be bought very shortly by the United States Steel Corporation, and such a purchase may furnish the needed stimulus to the pig iron market at large. Steel-making pig iron has been relatively firm, while the readjustment in foundry iron has been in progress, and steel works have been urgent about deliveries. There is said to be no disagreement between the steel corporation and the Valley furnacemen over the price for the second half, which will be in the neighborhood of $19 at furnace, but the insistence of the furnacemen on the delivery of a ton of coke by the corporation for every ton of iron delivered under the existing contract has been the subject of recent negotiations. A sale of Bessemer iron at $19.40 at furnace for third quarter delivery is reported. The fact that the steel corporation will make a large purchase of outside iron, in spite of the considerable additions to its own pig iron capacity this year, is one proof of the heavy consumption of steel products. Another appears in the pig iron statistics which show production at the rate of close to 20,000,000 tons a year on May 1, while reported pig iron stocks declined 5,000 tons in April. Pig iron production is now at a yearly rate 1,500,000 tons more than at this time in 1902, when Southern No. 2 foundry was selling at from $16 to $17 at Birmingham. The foundry iron market, the little there is of it, has shown a further decline the past week, and sales have been made of Southern No. 2 as low as $15, Birmingham. Association furnaces maintain their original position and are allowing the market to find its place. Northern iron is weaker, though very little is done, consumers not being satisfied that bottom has been reached. In the Chicago market local iron has declined 50 cents in the week. On the Atlantic seaboard import sales have ceased and it is not expected they will be resumed unless in occasional lots at pronounced concessions. Increasing domestic capacity for producing foundry pig iron is expected to take care of all needs from this time on. Foundries are maintaining a high rate of output, and strikes are few, wage demands being settled for the most part without serious interruption of work. Foundrymen evidently do not yet see any such change in the demand for their products as to make it worth their while to shut down and fight. Yet some of them note that inquiry is not so heavy this month as in preceding months and are questioning whether a change is just ahead. Labor troubles in some building lines are pronounced, notably at New York, and at Chicago the strike fever in certain branches of the metal trades is adding to the notoriety of that city for unreasonable labor demands. Agricultural implement manufacturers, whose contract purchases formed a fair fraction of the tonnage on the books of furnaces and iron and steel works one year ago, are now buying cautiously or holding aloof from the market. Yet the prospects in their industry are admittedly excellent. Railroads continue to make large demands on the mills, but there has been some falling off in specifications from steel car works. This is said to be due to a temporary cause, car works having good orders booked. However, plate mills have been better able to take care of miscellaneous orders lately and premiums need no longer be paid to get quick deliveries. The surplus of bar mill capacity is in evidence, bar iron particularly showing concessions, and the dissolution of the Eastern Bar Iron Association has emphasized the condition. In sheets there are varying reports, but the talk of an advance which was heard a short time ago, is no longer entertained. The steel market holds strong. On a recent inquiry for 4,000 tons German mills could procure but 1,000 tons a month beginning with July. Domestic steel mills note considerable inquiry for billets and sheet bars for the second half of the year.

PITTSBURG.

OFFICE OF *The Iron Trade Review*,
429 PARK BUILDING, May 19.

The situation has cleared up considerably since last week, the trade realizing that finished materials are the true index to the situation. The readjustment in steel-making pig has run its course, and has not affected finished lines, for which the demand is as good as ever, with specifications coming in freely and keeping mills busy. Foundry iron, of course, may have some distance to go yet before it reaches a proper level, and it is simply sagging, with practically no transactions, and no efforts being made to stir up interest.

There is no accumulation of pig iron at either blast furnaces or steel works, and in foundry there is no excess except such as comes from the offering of odd lots by consumers. At the end of a period of months during which deliveries were delayed and large quantities of spot iron bought to eke out supplies, it is not at all surprising that there should be considerable raggedness. The large steel works are ready to come into the market, having only enough pig iron to keep running for a short time, and requiring considerable iron even for third quarter. It develops that there is no contest between furnace and steel maker as to price and it is practically settled that second half business will be done at not less than $19 at Valley furnace, and possibly more. In foundry iron, of course, the trade awaits a readjustment of prices to suit the conditions in the trade, a heavier production of foundry grades, and a drop not simply equal to the decline in steel-making pig, but to the premium which has so long ruled on the foundry grade as well. This points to a price of between $19 and $20, Pittsburg, for No. 2 foundry, and when the market reaches this business will probably be done.

The reticence of the steel corporation in the matter of making further purchases of Bessemer pig, when it is well known the iron will be needed for second half, and about which there has been much comment, is due to the long-pending discussion regarding deliveries on the old contract made over a year ago, and which called for deliveries of 200,000 tons from October to March inclusive, at $16.50, Valley furnace. Between a fourth and a third of this iron remains to be delivered, and the furnaces which took the stand some time ago that they would only deliver the iron, one ton for a ton of coke received from the coke interest, adhere to this position. The official action of the furnace association, fixing the price of third quarter iron at $20 was simply a feature of the contest that has been in progress. With the easy coke movement, it matters very little whether furnaces get $3 coke from the corporation, or get it in the open market, and the problem will naturally solve itself, when a large purchase of Bessemer may be expected by the corporation. Meanwhile no official statement can be had that the corporation will come into the market.

The situation in plates is much improved after the little flurry, much misunderstood, caused by some car works

having an accumulation of materials other than plates, which called for a few days' cessation of plate shipments until other supplies were worked off. In structural shapes the condition is entirely satisfactory, specifications being good. In steel bars specifications and new business are good and there is no sign of weakness, iron bars being dull and declining. In merchant pipe the trade is in excellent shape, business being as heavy as the mills care to book. Premiums are demanded on sheet for quick shipment, deliveries being rather unsatisfactory, and the demand is excellent.

Outside of foundry iron and iron bars, the whole iron and steel market, whether from the standpoint of blast furnace, steel works, finishing mill or jobber, is entirely satisfactory and unaffected by the sensational stories which gained so much circulation in the past fortnight.

The whole iron trade expresses the deepest regret at the death of B. F. Jones, Sr. Universal expressions of regard and esteem are heard, and it certainly appears that the iron trade has lost its most loved and honored member.

Pig Iron.—Sales as yet have been quite light, but the situation in steel-making pig has cleared up and business is ready to be done at somewhere between $19 and $19.50 at Valley furnace for second half. We note one sale, of a fairly good tonnage, at $19.45, Valley furnace, for third quarter shipment. For whole second half furnaces generally name $19.25, which price might be shaded 15 cents, and possibly to $19 today, but there are signs that the market may actually score a little advance before much business is done. A new furnace, to be blown in shortly, which was regarded as a menace to the situation, is reported to be filled up for several months, and not looking for business. Furnaces are still behind on deliveries of Bessemer and basic, and it will take them until some time in July or August to get caught up. Steel works are hardly as well covered as furnaces are sold up. In foundry iron the situation is entirely different. While $21 is now a high price for No. 2 foundry for extended delivery, we note one sale actually made at this figure, for deliveries running six months. Most interests quote $21 nominally, or have already receded to $20 to $20.50, but it looks very much as if the deadlock would not be broken until say $19.50 was reached, which would harmonize with the market for Bessemer, in accordance with the relations which existed for numerous years, but were broken last fall. The abnormal market for foundry which has existed may be explained by the fact that the foundry trade has not been subject to that steadying influence which has been so marked in finished steel products, and which has undoubtedly kept the steel-making pig market within much narrower lines than would otherwise have been the case. Some furnaces are asking $20.25, Pittsburg, for forge, but this grade is likely to go with foundry, and there is practically no market on it today. Southern iron is unquotable, the "official" figures being a dead letter, with no one willing to take hold at the slightly lower figures named by outside furnaces, so that time must be allowed for the Southern furnaces to get their bearings again. We quote prices as follows:

Bessemer, Valley	$19 25 to 19 50
Bessemer, Pittsburg	20 10 to 20 35
No. 1 Foundry	21 25 to 22 00
No. 2 Foundry	20 50 to 21 00
Gray Forge, Pittsburg	20 00 to 20 40
Chilled Basic, Valley	19 35 to 19 50
Chilled Basic, Pittsburg	20 20 to 20 35

Steel.—We hear claims that foreign steel has been sold for Pittsburg and Ohio shipment, but they cannot be confirmed, and it looks as if the market has been, probably permanently, taken out of the hands of the foreigners. Domestic steel works are well filled up and are not pressing sales, while demand is not heavy, though what exists is urgent. A rather new factor in the situation is general inquiry from consumers for crude steel for extended delivery. As noted before, there has been no demand for steel on long-time contracts, but consumers are now sounding the market, and some business may be put through for second half. There are no works that seem anxious to make any large sales of billets and no attractive prices are being named. For early shipment and small lots we continue to quote the market at $30.50 at mill for Bessemer, or $31 to $32 delivered Pittsburg, with open-hearth practically the same price.

Ferro-Manganese.—We quote English ferro at $50 in large lots and $52.50 in ordinary small lots. No domestic ferro is offered, and the German product is out of the market, being higher than English.

Muck Bar.—The market is very quiet, mills quoting $35 to $35.50 for best local grades. There is some scattering inquiry, but mills are filled up for nearby shipment, and little business going.

Skelp.—There is very little doing. We quote grooved skelp at 2c to 2.05c, and sheared 2.10c to 2.15c. On iron skelp it is possible these prices might be shaded a trifle.

Rails and Track Material.—Demand for relaying rails is picking up, as new rails cannot be had in small lots, mills being decidedly behind on deliveries against large contracts. We quote: Standard sections, 50 pounds and over, in lots of 500 tons and over, $28; car lots and less than 500 tons, $30; less than car lots, $32; light rails, 8 pounds in carload lots, $39; less than carload lots, $40; 12 pounds, $38; 16 and 20 pounds, $36; 25 to 40 pounds, $36. Track materials: Spikes, 2.15c to 2.20c; track bolts, square heads, 2.05c; hexagon heads, 2.65c; fish plates, 1.60c on orders accompanying large rail contracts, otherwise 2c to 2.10c is asked.

Plates.—A little flurry was caused in plates the past fortnight, caused by shipments having to be interrupted to some steel car works. The condition simply was that the works had been receiving plates proportionately more rapid than other materials entering into cars, and as they were already working to full capacity, could not work off the surplus plates by getting more of the other materials and increasing output. Shipments of plates had therefore to be suspended for a few days only, until supplies were evened up. This gave rise to rumors that the plate market was inclined to weakness, which was not the case. The incident illustrates what enormous consumers of plates the steel car works are. As they are booked for months ahead with car orders the condition in the plate market was only of the most temporary character. Specifications against contracts are good, and there is some new buying, premiums of $2 or $3 a ton being occasionally paid. Official prices remain: Tank plates, ¼-inch thick and up to 100 inches in width, 1.60c at mill, Pittsburg; flange and boiler steel, 1.75c; marine, ordinary firebox, A. B. M. A. specifications, 1.80c; still bottom steel, 1.80c; locomotive firebox, not less than 2.10c, and it ranges in price to 3c. Plates more than 100 inches, 5c extra 100 pounds. Plate 3-16 inches in thickness, $2 extra; gauges Nos. 7 and 8, $3 extra. These quotations are based on carload lots, with 5c extra a hundred pounds for less than carload lots. Terms, net cash, in 30 days.

Pipes and Tubes.—The market is in excellent shape, and the volume of business entirely satisfactory, keeping mills fully engaged to supply the demand. Orders for the larger sizes have been particularly heavy, and makers find not the slightest cause for dissatisfaction in the current outlook. The volume of business the past two or three weeks shows a decided increase, and so far this month the volume is in excess of last May. We quote official prices as follows, in carload lots to consumers, f. o. b. Pittsburg, plus freight according to Tube Rate Book to destination:

MERCHANT PIPE.

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Wrought Iron Pipe. Black. Percent.	Wrought Iron Pipe. Galv. Percent.
⅛, ¼ and ⅜ inch	68	58	65	55
½ inch	70	60	67	57
¾ to 6 inch	75	65	72	62
7 to 12 inch	69	59	66	56
Plugged and Reamed				
1 to 4 inch	73	63	70	60
Cut 3 to 6 feet				
⅛, ¼ and ⅜ inch	63	52	60	49
½ inch	65	54	62	51
¾ to 6 inch	71	60	68	57
7 to 12 inch	65	53	61	50
Cut 6 feet and longer				
⅛, ¼ and ⅜ inch	64	53	61	50
½ inch	66	55	63	52

¼ to 6 inch	72	61	69	58
7 to 12 inch	66	54	62	51
Extra Strong Plain End				
⅛ to 8 inch	67	57	63	53
Threads only	66	56	62	52
Threads and Couplings	65	55	61	51
Double Extra Strong Plain End				
½ to 8 inch	59	49	55	45
Threads only	58	48	54	44
Threads and Couplings	57	47	53	43

NOTE.—Orders for less than carload will be charged at 12½ percent advance. Extra and Double Extra Strong Cut Lengths, lower random discounts by 10 percent net for 6 feet and longer, and 15 percent net for 3 to 6 feet.

BOILER TUBES.

Steel.

	Percent.
1 to 1½ inches	45
2¼ to 5 inches	62½
1¾ to 2¼ and 6 to 13 inches	52½

Iron.

	Percent.
1 to 1½ inches	36½
2¼ to 5 inches	45½
1¾ to 2¼ and 6 to 13 inches	35½

CASING.

	S. and S. Percent.
2 to 3 inches	58
3¼ to 4 inches	60
4¼ to 12½ inches	63

Bars.—In iron bars the situation is that contract business was largely done several weeks ago, and no large contracts are now being taken, mills being filled up to July 1 and consumers covered. Some irregularity has resulted from the entire collapse of the Eastern Bar Iron Association, and lower quotations by Western mills, so that there are offerings in Pittsburg of car lots at 1.85c and possibly less. The Eastern market is far below the differential formerly maintained between the East and Pittsburg, and Eastern mills are now quoting as low as 1.70c at their mills, equivalent to 1.60c or 1.80c, Pittsburg, according to the direction the material moves. The official price on iron bars remains 1.85c, Youngstown, or 1.89¾c, Pittsburg, and the large mills pay no attention to occasional scattered offerings at lower figures. The regular bimonthly wage settlement was held last week, and showed, as at the two previous examinations, an average of between 1.70c and 1.80c at mill, for March and April shipments. Steel bars are very firm with a fair run of business. We quote: Bessemer steel bars, 1.60c; open-hearth, 1.70c; plow beams and cultivator beams, 1.60c, net; channels, angles, zees and tees, Bessemer under 3 inches, 1.70c; over 3 inches, 1.80c; bar iron, 1.85c; Youngstown, or 1.89¾c, Pittsburg, with freight added to point of delivery from Youngstown. Hoops and bands are quoted at 1.90c, full extras, in 250-ton lots and over, and 2c in less than 250-ton lots.

Structural Material.—There is nothing new in this line. The output of the mills is contracted for months ahead, and nothing but labor troubles can affect the situation. Specifications are satisfactory. We quote as follows: Beams and channels, 3 to 15 inches, 1.60c; 18 to 24 inches, 1.70c; tees, 1.65c; zees, 1.60c; angles from 3 to 16 inches, 1.60c; universal mill plates, 1.60c.

Sheets.—Deliveries of sheets are not at all satisfactory, the leading interest being uncomfortably loaded, and the independents not getting steel with sufficient regularity. The market is very strong. While it is probable that on large lots the official prices can be done, small lots are commanding premiums, mills claiming to be getting as much as $4 above official prices on small lots for early shipments, while jobbers will not do even carloads under 2.85c for black or 3.95c for galvanized. While the pressure in sheets cannot be expected to keep up indefinitely, there is no easing up in sight for a few months. On contracts for 500-bundle lots and over we quote regular prices as follows: No. 28, 2.75c; No. 27, 2.65c; No. 26, 2.55c; Nos. 22 and 24, 2.45c; Nos. 18 and 20, 2.35c; Nos. 14 and 16, 2.25c; Nos. 10 and 12, 2.10c to 2.15c. Galvanized: No. 16, 2.60c; No. 18, 2.85c; No. 26, 3.35c; No. 27, 3.60c; No. 28, 3.85c; No. 29, 4.35c; No. 30, 4.50c.

Wire and Wire Nails.—The market is very firm all along the line. There is not a great deal of activity, but no sign of weakness, mills being well filled up on old contracts for some time ahead. We quote: Wire nails, carload lots, to jobbers, f. o. b. cars, Pittsburg, $2; plain wire, carload lots, $1.90; barb wire, carload lots, $2.30; staples, carload lots, $2.20. Galvanizing, 30 cents extra. Carload lots to retailers are held at 5 cents advance in all lines, and on less than carload lots a further advance of 10 cents is charged. Steel cut nails are quoted as follows: Carload lots, $2.15, and less than carload lots, $2.20, f. o. b. Pittsburg, plus freight to point of destination. Iron cut nails are $2.25 in carload lots and $2.30 in less than carload lots. Terms, 60 days, less 2 percent off in 10 days.

Merchant Steel.—There is nothing new in this line, prices being firm and unchanged. We quote: Turned cold rolled and ground shafting, 47 off in carload lots and 42 percent off in less than carload lots; tire steel, 2.15c to 2.25c; spring steel, 2.25c to 2.35c; toe calk, 2.30c to 2.40c. The following differentials maintain: Less than 2,000 pounds of a size and not less than 1,000 pounds, 10 cents advance; less than 1,000 pounds of a size, 30 cents advance. Tool steel is quoted 7 cents and upwards, according to the grade.

Spelter.—The market has been extremely quiet, but no lower, and we repeat last week's quotation of 5.63½c for prime western brands for spot shipment and 5.53½c for June.

Old Material.—There is nothing doing in the scrap market, as every one is waiting for the pig iron market to get thoroughly settled. In heavy melting stock dealers are still short and are absorbing what comes out in order to fill their regular contracts. When steel mills come into the market again they will expect to buy heavy melting stock at $1.50 to $2 below recently ruling figures, or, say, $20 or a little under. Whether this can be done remains to be seen. At present there is no market. Scrap for foundries and iron mills is working around to a lower level, there being practically no market meanwhile. We note a sale of No. 1 cast scrap at $20, but this is considerably above what the average buyer would pay, and the market is likely to settle around $19.

Coke.—The coke market has become very easy, and there is now no trouble to get all the coke required. Prices are declining, and odd lots can be bought as low as the contract price, so that there is no disposition to make contracts until it is certain the bottom has been reached. Spot foundry is $4.50 to $5 at ovens, and spot furnace around $3.50. Production is fully up to consumptive demands, and some works are running slacker than they could, in view of the supply of empties. There has, however, been some delay in the movement of loaded cars, causing slight uneasiness to furnaces here and there. Production in the upper Connellsville region in the week ended May 9 was 250,000 tons, a gain of 1,000 tons from the previous week, which had shown a decline, while the lower Connellsville region made 53,100 tons, making a total of 303,100 tons for the whole region.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, May 19.

Pig iron is still weak locally and prices are getting lower. Northern brands are quoted at 50 cents a ton less than a week ago, and Southern No. 2 foundry has been sold at $15 Birmingham, an extreme low point, in the week under review. Demand has fallen to a minimum. Finished materials are generally quiet. There is no demand for structural steel, except for small lots from store. Sheet business is light and reports are current of independent producers shading prices. Bar iron is without animation and 1.75c could be done on a good sized order without difficulty. Coke is quiet with large stocks on local tracks and offerings at $6.40 spot delivery. Scrap is dead and prices have fallen off again from 50 cents to $1 a ton. Consumption of wire products has eased to a large extent, though jobbers are keeping mills busy with orders for stock. Buying of merchant steel and steel bars is only of moderate proportions, and sales of the latter are reported at 1.75c Chicago. There is a good demand for plates, light rails, billets and merchant pipe. Premiums are no longer asked for quick deliveries

on plates, owing to the fact that a large producer is now able to guarantee shipment within a few weeks from date of order. On light rails, mills are sold ahead for two months, and the same is true with regard to manufacturers of merchant pipe. The demand for foreign billets is very heavy, but few sales are recorded, as importers cannot promise deliveries before the last quarter of the year. Notwithstanding the unfavorable appearance of present conditions in the iron and steel market, manufacturers are optimistic as to the future and have the situation well in hand. Labor disturbances in the metal trades, which are largely responsible for the small volume of buying, are gradually settling themselves and a satisfactory adjustment of all pending troubles is looked for in the near future. As soon as these are disposed of, an active buying movement is expected.

Pig Iron.—There has been little demand for pig iron during the past week, melters contenting themselves with purchases large enough to meet their current wants. This is essentially a waiting market, some producers being no more anxious to sell than foundrymen to buy. Very few foundries have thus far covered for their requirements in the last half, and as the contracts of most of them will expire in the next six weeks, it is only a question of time when they will have to come into the market. In the meantime, the large manufacturers of pig iron are permitting independent furnaces to take all the business that is being offered at whatever price they are disposed to accept, reserving their own tonnage until the market has secured greater stability. Association furnaces are maintaining official prices, and it is doubtful if any reduction in these quotations will be made until the bulk of the high priced iron which was booked last fall has been delivered. Foundrymen are canceling these contracts wherever an opportunity presents itself, but the tonnage represented by those that have done so is not of large proportions. There is no regular basis of values for the trading that is being done. A 200-ton lot of Southern No. 2 soft for June delivery was sold at $15 Birmingham during the week, and the same seller is offering more iron of the same grade at this price. Several sales have been made on the basis of $15.50 and $16 for No. 2 foundry, and the former quotation practically represents the market price in this city. Northern grades have weakened 50 cents a ton during the week, and we have revised our prices accordingly.

A lot of Northern No. 1 foundry is being offered at $19 Chicago, immediate shipment. This iron is owned by a foundry in Cragin, Ill., and amounted in all to about 3,000 tons. It has been sold in small lots to local foundries at prices $2 to $3 per ton below the schedule, the question of price not being the main consideration in the disposition of the iron. Reports were circulated to the effect that the Pullman purchase recently made was of this iron, but the statement is denied both by officers of the company and the parties offering the iron for sale. We quote as follows:

Lake Superior charcoal	$24 00 to 25 00
Local Coke Foundry No. 1	21 50 to 22 00
Local Coke Foundry No. 2	21 00 to 21 50
Local Coke Foundry No. 3	20 50 to 21 00
Local Scotch Foundry No. 1	21 50 to 22 00
Southern Coke No. 1	20 35 to 22 35
Southern Coke No. 2	19 85 to 21 85
Southern Coke No. 3	19 35 to 21 35
Southern Coke No. 4	18 85 to 20 85
Southern No. 1 soft	20 35 to 22 35
Southern No. 2 soft	19 85 to 21 85
Southern Gray Forge	19 85 to 20 35
Southern Silveries (4% to 5% silicon)	22 85 to 23 85
Southern Silveries (5% to 6% silicon)	23 35 to 24 35
Jackson Co. Silveries (6% to 8% silicon)	29 30 to 30 30
Ohio Strong Softeners	24 00 to 24 50
Alabama and Georgia Car Wheel	28 35 to 29 35
Malleable Bessemer	21 50 to 22 00
Standard Bessemer	21 50 to 22 00
Basic iron	22 35 to 22 85

Bars.—The demand is not heavy for either iron or steel, specifications and new business having fallen off. Reports are current that a large jobber is offering steel on the basis of 1.75c Chicago. Iron is weak and mills are quoting 1.75c on desirable business. We quote mill shipments, Chicago delivery, as follows: Bessemer steel, 1.76½c; angles, less than 3x3, 1.86½c base; hoops, in lots of 250 tons and greater, 2.06½c; less than this amount, 2.16½c; iron, 1.75c to 1.80c. Quotations from store are as follows: Steel, 2c to 2.10c; iron, 2.10c to 2.15c; hoops, 2.40c to 2.50c; angles, 2.25c rates.

Sheets.—Consumers are showing no haste to place orders, and the volume of business transacted during the week has been light. Reports are current that independent mills are cutting prices. We make no change in our quotations, which on mill shipments, carload lots, Chicago delivery, are as follows: Black sheets, No. 27, 2.86½c to 2.91½c; No. 28, 2.96½c to 3.01½c. Galvanized, 75 and 5 percent. On lots from store, we quote No. 27 Black, 2.95c to 3c; No. 28, 3.05c to 3.10c. Galvanized, 75 and 2½ percent.

Structural Steel.—The strikes in the various metal trades have shut off practically all the demand for shapes, and mills report a light demand during the week under review. We quote mill prices, Chicago delivery: Beams and channels, 16 inches and under, 1.75c; 18 inches and over, 1.85c; universal plates, 1.75c; angles, 3x3 and larger, 1.75c; tees, 3x3 and larger, 1.80c; zees, 1.75c. Store trade is quoted at 2¼c per pound.

Plates.—A large producer is now able to give fairly quick shipments on plates, and the premiums which have been asked in the past for prompt deliveries have been removed. A good business has been transacted in the week closed. We quote mill prices, Chicago delivery: Tank steel, ¼-inch and heavier, 1.75c; flange steel, 1.85c. Prices for lots from stock, tank steel, ¼-inch and heavier, 2.15c to 2.25c; 3-16, 2.25c to 2.35c; No. 8, 2.30c to 2.40c; No. 10, 2.35c to 2.45c; flange steel, 2.40c to 2.50c.

Rails and Track Supplies.—There has been a good demand for light rails, the leading local producer having sold its capacity for two months ahead. Heavy sections are quiet, as mills are not in position to give quick deliveries. We quote heavy sections, 500 tons and over, $28; less than 500 tons to carload lots, $30; less than carload lots, $32; second quality $27; light rails, 45 pounds, $34 to $35; 12 pounds, $39 to $40, with regular differentials for intermediate sizes. Track supplies, mill shipments: Angle bars, 2c to 2.10c; spikes, first quality, 2.25c (out of store carload lots, 2.35c to 2.45c rates); second quality, 2.10c; track bolts, 3½x¾, with square nuts, 2.85c to 3c per 100 pounds; with hexagon nuts, 3.05c to 3.15c, with usual differentials for other sizes.

Merchant Steel.—A few contracts have been placed for season requirements, but the total tonnage of the week's business is not of large proportions. We quote mill shipments, Chicago delivery, as follows: Spring steel, 2.65c to 2.75c; sleigh shoe, 1.95c flat sizes; concave and convex, 2c; out of store, 2.15c; cutter shoe, 2.50c to 2.60c; machinery steel, 2.15c to 2.25c base; plow steel, 2.50c and upwards, according to quality; toe calk, 2.30c to 2.40c; out of stock, 3c to 3.10c; ordinary tool steel, 6c to 7c; specials, 13c and upwards; less than carload lots, 5 to 10 percent higher; cold rolled shafting, carload lots, 47 percent off; less than carload lots, 42 percent off.

Merchant Pipe.—There is an excellent demand for all sizes of pipe, though on the larger sizes, mills are sold up for several weeks. We quote carload lots, mill shipments, random lengths, f. o. b. Chicago, as follows:

	Steel Pipe.		Guaranteed Wrought Iron Pipe.	
	Black. Percent.	Galv. Percent.	Black. Percent.	Galv. Percent.
⅛ to ¾ in. inclusive	66.35	56.35	63.35	53.35
½ inch	68.35	58.35	65.35	55.35
¾ to 6 inches	73.35	63.35	71.85	61.85
7 to 12 inches, inclusive	67.35	57.35	64.35	54.35

Less than carload lots, 12½ percent advance over above prices.

Boiler Tubes.—Manufacturers and jobbers report a good demand, and prices are firm. Our quotations below are on carload lots, mill shipments, f. o. b. Chicago. On less than carload lots from mill, 12½ percent is to be added:

	L. W. Steel Percent.	C. C. Iron Percent.
1 to 1½ in.	43.35	38.35
1¼ to 2½ in.	55.85	35.85

2¼ to 5 in	60.85	45.85
6 to 12 in	55.85	35.85

For lots direct from warehouse stock:

	L. W. Steel Percent.	C. C. Iron Percent.
1 to 1½ in	40	25
1¼ to 2½ in	50	32½
2¼ to 5 in	57½	42½
6 to 12 in	50	32½

Cast Iron Pipe.—Business is light, being limited to small lots for repairing purposes. Some large contracts are pending. We quote f. o. b. Chicago, carload lots, 4-inch water pipe, $34; 6-inch, $33; 8-inch and upwards, $32; gas pipe $1 a ton higher. On large orders these prices can be shaded.

Billets and Wire Rods.—There is a heavy demand for billets from all parts of the country, but little business is closed, from the fact that deliveries on foreign material cannot be promised before the last quarter of the year. We quote German basic Bessemer billets, $29 to $29.50 seaboard; domestic Bessemer billets, $31; open-hearth billets for rolling mill use, $31 to $31.50; open-hearth billets for forging purposes, $36 to $40; wire rods, $40.

Wire and Wire Nails.—There is a good demand from jobbers all over the west for wire nails and farming material. The demand early in the spring was heavy and stocks generally were depleted. Mills are receiving many requests for prompt shipments, but delivery on any material cannot be given within three weeks, and on some as late as six weeks. We quote prices to jobbers, Chicago delivery, as follows: Wire nails, carload lots, $2.20; less than carload lots, $2.30. Cut nails, steel, carload lots, $2.26½; less than carload lots, $2.36½. Plain wire, $2.10 carloads, and $2.20 in smaller lots; galvanized, carloads, $2.40; smaller lots, $2.50. Barbed wire, carloads, $2.50; less than carloads, $2.60; galvanized, carloads, $2.80; less than carloads, $2.90. Staples, carloads, $2.30; smaller lots, $2.40; galvanized, carloads, $2.60; smaller lots, $2.70. Bale ties, 85 percent discount f. o. b. Waukegan on straight carload lots. Poultry netting, 85 and 5 percent discount from list f. o. b. Joliet or DeKalb, with actual freight allowed not exceeding 50 cents per 100 pounds.

Coke.—There is little demand for coke, and the local tracks are crowded with loaded cars. Offerings of Connellsville coke are being made in this city on the basis of $3.75 at the ovens, which makes the Chicago price $6.40.

Old Material.—There is absolutely no demand for scrap and prices have fallen again 50 cents to $1 a ton. All the mills are loaded with material and in view of the weakness of the finished product are not in the market for any kind of scrap. We quote gross tons, as follows:

Old iron rails	$22 50 to 23 00
Old steel rails (mixed lengths)	16 50 to 17 00
Old steel rails (long lengths)	21 00 to 21 50
Relaying rails	29 50 to 30 00
Old wheels	21 00 to 21 50
Heavy melting steel	16 00 to 17 00
Mixed country steel	13 00 to 13 50

The following are selling prices per net ton:

No. 1 R. R. wrought	18 00 to 18 50
No. 2 R. R. wrought	16 50 to 17 00
Shafting	17 00 to 17 50
Dealers' forge No. 1	15 50 to 16 00
No. 1 busheling and wrought pipe	13 00 to 13 50
No. 1 cast	15 00 to 15 50
Heavy cast (300 pounds and over)	10 50 to 11 00
Railway malleable	15 00 to 15 50
Country malleable	13 00 to 13 50
Iron axles	22 50 to 23 00
Steel axles	18 00 to 18 50
Cast borings	6 50 to 7 00
Mixed borings, etc	6 50 to 7 00
Wrought turnings	12 50 to 13 00
Machine shop turnings	12 50 to 13 00
Iron axle turnings	13 00 to 13 50
Steel axle turnings	12 50 to 13 00
Stove plate and light cast scrap	11 00 to 11 50
Old iron splice bars	19 50 to 20 00

CLEVELAND.

OFFICE OF *The Iron Trade Review*, 1064 ROSE BUILDING, May 20.

The movement of ore from the mines is progressing rather slowly. Owing to the fact that the sale of Bessemer ores is at a standstill, there is no disposition to hurry shipments. Vesselmen are not despondent, however, as they anticipate that when ore buying sets in, business on the lakes will be much more lively. Shippers concur in this expectation and express fear that there will be a congestion at the lower docks later in the season. They say that dispatch is not as good as it was this time last year.

Pig Iron.—Dullness in the market continues. Among the few sales were one of basic at $20, Valley, for immediate shipment, and one of No. 2 foundry at $21.95, Cleveland, spot. The Cleveland sales agent of an independent Tennessee furnace, which has been selling at $16 at furnace for No. 2, has received word from the furnace that it is now 40 cars behind delivery in its orders and is pretty well sold up for the next thirty days except on lower grades of iron. Association furnace interests are hoping that the independents will soon have taken orders to such an extent that they will not be so eager to accept business at low prices. We quote as follows, f. o. b. Cleveland:

Bessemer	$20 50 to 20 75
No. 1 Strong Foundry	21 75 to 22 00
No. 2 Strong Foundry	21 00 to 21 50
No. 3 Foundry	20 25 to 20 75
Scotch No. 1	22 00 to 22 25
Scotch No. 2	21 25 to 21 75
Gray Forge, Valley	19 00 to 19 25
Lake Superior charcoal	24 00 to 25 00

Finished Material.—Dealers in nearly all lines find little of which to complain. Buyers are still hesitating about placing large orders for the future, but demand for early requirements shows a healthy condition of business. In spite or rumors in the East and West, steel is firm and in fair demand, and the price for steel bars, 1.60c for Bessemer and 1.70c for open-hearth, is maintained. The largest producers of bar iron are still quoting 1.80c, Youngstown, and are said to have received 1.85c for small lots, but local mills are selling at 1.75c, Cleveland, and one company in Northern Ohio is delivering bar iron in Cleveland, freight paid, at 1.75c. The smaller mills assert that, in spite of reports to the contrary, they are giving prompt delivery, one order of considerable size having been filled within ten days. Plates, which have so long been the strongest feature of the market, are now delivered promptly, sometimes within two weeks, and premiums are no longer paid. The demand for light plates is strong, but some consumers of heavy plates are not so insistent about deliveries as they were a short time ago. Building operations in this vicinity are confined to a large extent to structures of moderate size, but the volume of business is fair and labor troubles have not seriously interfered with work. There is only a moderate demand for sheets. The announced prices of the principal producer for sales through jobbers are as follows: Galvanized sheets, mill sales, carload lots, Nos. 10 and 11, 2.60c; Nos. 12-14, 2.70c; Nos. 18 to 21, 3c; Nos. 22 to 24, 3.20c; Nos. 25 and 26, 3.55c; No. 27, 3.80c; No. 28, 4.05c; No. 29, 4.45c; No. 30, 4.95c. Galvanized sheets out of stock are quoted 75 and 5 off. For 3-16-inch black sheets and heavier we quote 2.15c, Cleveland. Mill sales of black sheets to consumers are made on the following basis: No. 24, 2.65c to 2.75c; No. 26, 2.75c to 2.85c; No. 27, 2.85c to 2.95c. The following are prices out of stock. No. 10, 2.35c to 2.50c; No. 12, 2.45c to 2.60c; No. 14, 2.50c to 2.60c; No. 16, 2.60c to 2.70c; Nos. 18-20, 2.75c to 2.85c; Nos. 22-24, 2.85c to 2.95c; Nos. 25-26, 2.95c to 3.05c; No. 27, 3.05c to 3.15c; No. 28, 3.15c to 3.25c.

Old Material.—Dealers report that it is impossible to make sales except to help other dealers fill contracts. Not for a long time has there been such dullness in the scrap market. We have not revised quotations on account of the impossibility of obtaining reports of sales. We quote f. o. b. Cleveland, gross tons:

Old iron rails	$25 00 to 26 00
Old steel rail (over 6 feet)	22 00 to 23 00
Old steel rails (6 feet and under)	20 50 to 21 00
Old car wheels	24 50 to 25 00
No. 1 R. R. wrought scrap	22 00 to 22 50
Mill scrap	19 00 to 19 50
No. 1 machine cast scrap	18 50 to 19 00
Iron axles	29 00 to 30 00
Steel axles	28 00 to 29 00
Axle turnings	17 00 to 18 00
Wrought turnings (free from cast)	16 00 to 17 00
Cast borings	10 00 to 10 50
Uncut wrought iron boilers	11 00 to 12 00
Steel boiler plates	18 00 to 19 00
Grate bars	13 00 to 14 00
Pipes and flues (clean)	17 50 to 18 50
Tank iron	17 00 to 18 00
Hoop and band iron	13 50 to 14 50

Sheet iron	12 00 to 13 00
Wrought drillings	15 50 to 16 50
Malleable iron (railroad)	19 00 to 20 00
Malleable iron (agricultural)	16 50 to 17 00
Stove plate	14 00 to 15 00
Heavy steel	20 50 to 21 00

CINCINNATI.

May 19.

The coke market continues irregular and easy; still there is so much inferior quality coke on the market that low quotations often imply poor quality. For really desirable foundry coke $4.25 f. o. b. ovens and for the best $4.50 and $4.75 is firmly held but the market is flooded with quotations ranging from $3.50 up to $4 f. o. b. ovens. Some producers have asked their agents to withdraw from the market until a more settled condition prevails.

Pig Iron.—The opinion today that the market is steadier and that for the present the decline in prices has been arrested. During the week some low prices have been named and the market is still easy and unsettled but there is less tendency now to disregard values and make a price that will interest the buyer. Furnaces that have been so urgently seeking business and doing whatever was necessary to get orders are now getting so far sold up that they are not so anxious for business. Some of the independent furnaces have stayed out of the recent scramble and called a halt at $16 Birmingham for No. 2 foundry. It has become apparent during the week that there is less cheap iron to be had than a week ago. The report of stocks of iron on hand May 1, showing a reduction, while there was an increase in production, has caused the trade to stop and take another view of the situation. This statistical exhibit being accompanied with increasing inquiry and more cheerful reports from traveling men, had its sentimental effect, which is reflected in the views expressed by selling agents. There has been a slight increase in the demand for spot iron. The orders are for moderate quantities but still there is no indication of decreasing consumption and with iron coming forward freely on old contracts any increase at all in small quick shipment business is encouraging. The attitude of the buyer has not changed; still the developments of the week furnish a better story for the salesman. The association furnaces have held to their schedule and the representatives of the association interests maintain that after the buying movement starts, present schedule quotations may look cheap. We have had these spells of confidence and steadiness before during this decline and what the near future holds in store requires considerable self-confidence to predict. As to the low prices or quotations made the past week, we hear of $15.50, Birmingham, for No. 2 foundry and $14 Birmingham for No. 4 foundry. Gray forge has been quoted down to $13.75 Birmingham. These quotations represent extreme inside prices and are not the ruling figures, as sales have been made at higher prices; but trade has been so small in volume that all prices must be taken into account in such a situation. Current quotations today are as follows f. o. b. Cincinnati:

Southern Foundry No. 1	$19 50 to 20 00
Southern Foundry No. 2	18 75 to 19 50
Southern Foundry No. 3	18 00 to 18 50
Southern Foundry No. 4	17 25 to 17 75
Southern Foundry No. 1, soft	19 50 to 20 00
Southern Foundry No. 2, soft	18 75 to 19 50
Gray forge	17 00 to 17 50
Northern Foundry No. 1	22 15 to 22 65
Northern Foundry No. 2	21 65 to 22 15
Southern car wheel iron	26 75 to 27 75

Finished Material.—The market shows no quotable change. Buyers are disposed to hold off and order only to cover immediate requirements. They are encouraged in this course by the action of the pig iron market, but sellers seem to view the situation with complacency and are content to have buyers allow their stocks to run down. There is no doubt that specifications on regular orders have been smaller in the recent past, but the decrease in demand has had no perceptible influence on prices. Galvanized sheets are being quoted at 75 and 5 percent off. We quote black sheets No. 27 at 2.78c in car lots of 500 bundles. Black sheets out of store are selling as follows: No. 28, 3.10c; No. 27, 3.20c; No. 16, 2.65c; No. 14, 2.55c; No. 12, 2.45c; No. 10, 2.35c. Tank plates are firm and sell out of store at 2.15c for ¼-inch and 2.25c for 3-16-inch. Beams and channels are quoted at 2.15c to 2.25c from stock, and angles at 2.15c to 2.25c for base sizes. In merchant pipe there is no change in the situation. There is a fairly good steady trade and no change in prices. We quote:

MERCHANT PIPE.
(Basing Discounts.)

	Steel Pipe. Black. Percent.	Steel Pipe. Galv. Percent.	Guaranteed Wrought Iron Pipe. Black. Percent.	Guaranteed Wrought Iron Pipe. Galv. Percent.
⅛, ¼, ⅜ inch	66.7	56.7	63.7	53.7
½ inch	68.7	58.7	65.7	55.7
¾ to 6 inch, inclusive	73.7	63.7	70.7	60.7
7 to 12 inch, inclusive	67.7	57.7	64.7	54.7

BOILER TUBES.

	Steel Percent.	Iron Percent.
1 to 1½ inch	41.2	35.2
1¾ to 2½ inch	54.2	34.2
2¾ to 5 inch	59.7	44.2
6 to 13 inch	54.2	34.2

Old Material.—The market is quiet with but little trading. The following quotations nominally represent values prevailing:

Old No. 1 railroad wrought, net tons	$17 00 to 18 00
Cast machine and foundry, net tons	15 00 to 16 00
Old iron rails, gross tons	20 00 to 21 00
Old steel rails, gross tons	18 00 to 19 00
Old short lengths, gross tons	18 00 to 19 00
Old iron axles, net tons	21 00 to 22 00
Stove plate, net tons	10 00 to 11 00
Wrought turnings, net tons	11 00 to 12 00
Cast borings, net tons	8 00 to 9 00

PHILADELPHIA.

May 19.

The tendency is still toward lower prices, but there is no marked change. Conditions of this time last year, when material could not be obtained except by the payment of large premiums for deliveries, are reversed. Material can be had promptly at quoted prices and it could be obtained in some lines at concessions, if buyers would place large orders. A rapid decline in prices may not come, but lower figures are expected to precede any buying movement of large volume.

Pig Iron.—About the only sales being made are small lots for prompt shipment. The story told by statistics of production and consumption is favorable, but some indications are not encouraging. The railroads are furnishing all equipment required and the demand for new cars is not so urgent. Hence it is not believed that the requirements of car builders will be so large. The outlook for building operations is not favorable. It is extremely difficult to give prices with exactness, as quotations vary according to circumstances, but they are about as follows: No. 1 X foundry, $21 to $22; No. 2 X foundry, $20 to $20.50; No. 2 plain, $19.25 to $19.75; gray forge, $19 to $20; Middlesboro No. 3, $20 to $20.50; Scotch, $21.50 to $22; basic, $19.25 to $19.50; Middlesboro in cargo lots, $17.50 to $18.

Finished Material.—Since the dissolution of the Eastern Bar Iron Association, there has been a reduction of from $2 to $3 per ton on bar iron and a large tonnage has been sold. Plates and shapes are rather dull without change of prices. We quote as follows: Plates in small lots, 1.90c to 1.95c; carload lots, ¼-inch and thicker, 1.75c to 1.80c; universal plates, 1.80c; flange, 2c; marine, 2.10c to 2.15c; fire box, 2.20c to 2.30c. For best refined bar iron, 1.85c to 1.87½c, carload lots, is the range, and 1.75c to 1.80c for steel bars. Beams, angles or channels, ordinary sizes, are quoted at 1.73½c to 1.78½c, carload lots with the usual addition for smaller quantities.

Old Material.—The market is dull and sales are being made at concessions, but prices are fairly firm. We quote: Old steel rails, $21.50 to $22; miscellaneous heavy steel scrap, $20.25 to $20.75; low phosphorus scrap, $28 to $29; old steel axles, $26 to $26.50; old iron axles, $28.50 to $29; old iron rails, $24 to $24.50; old car wheels, $22.50 to $23; choice scrap R. R. No. 1 wrought, $22.50 to $23.50; country scrap, $19 to $20; machinery cast, $19 to $20; No. 2 light scrap (forge), $18 to $18.50; No. 2 light scrap (ordinary), $14 to $15; wrought turnings, $16 to $16.50; wrought turnings, choice heavy, $17 to $18; cast borings, $11 to $11.50; stove plate, $15.50 to 16.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, No. 150 NASSAU ST. May 19.

Pig Iron.—The statement is made that some buyers who have been holding off, have entered the market recently and covered some of their requirements for the second half, but there appears to be little of this. All of the trading done nowadays is for small lots, having little or no effect on the general situation. It is evident that the price at which consumers will purchase has not been reached, but there has been no relinquishment of their belief that they will be able to purchase at better prices later on. The associated Southern furnaces are maintaining their prices, and are confident that the waiting policy of buyers will be abandoned in a few weeks at the utmost. Prices for all domestic brands for immediate delivery are irregular, inclining to weakness. The market for foreign irons is duller now than in months, and after diligent inquiry we have been unable to note a sale for several weeks past. Cables for warrants show a reactionary tendency, with mail advices as to the outlook indicating that some apprehension is felt. We quote New York prices for immediate delivery as follows: No. 1 X Northern, $21.50 to $21.75; No. 2 X Northern, $20.25 to $20.75; No. 2 plain Northern, $19.75 to $20.25; No. 1 Southern foundry, $21.50 to $21.75; No. 2 Southern foundry, $20.50 to $20.75; No. 3 Southern foundry, $19.50 to $19.75; No. 4 Southern foundry, $19 to $19.25.

Billets.—Actual sales show a falling off, because satisfactory deliveries cannot be obtained. A good idea of the situation is afforded in an inquiry received by a leading importer here yesterday for 4,000 tons of German basic billets. Today a cable was received stating that the order could only be filled in deliveries of 1,000 tons per month during July, August, September and October, at $28.50, New York delivery, duty paid. Some large negotiations that have been in progress have been temporarily given up, buyers either being dissatisfied with the delivery promised, or thinking that prices will be easier.

Finished Iron and Steel.—Labor troubles still hang like a cloud over the finished material market, which during the week was extremely dull. The American Bridge Co. reports the dullest week it has had this year, although it has received verbal assurances that it will get contracts aggregating nearly 200,000 tons. The principals, however, are unwilling to sign the documents pending existing labor difficulties. Sheets are inactive because of these labor conditions, one of the largest jobbing houses here reporting that it "never saw trade so dull." In consequence there has been a slight return to selling at concessions. Plates are fairly active, with deliveries showing considerable improvement, and premiums rarely heard off. Bars are lower, the dissolution of the Eastern Bar Iron pool having scared some sellers. Accurate quotations are difficult to obtain. New York prices are as follows: Beams and channels, 15 inches and under, 1.75c to 1.90c; angles, 3 to 6 inches, 1.75c to 1.90c; zees, 1.75c to 1.90c; bulb angles, 2.05c to 2.35c; deck beams, 2.05c to 2.25c; sheared steel plates, tank, 2.10c to 2.15c; flange, 2.25c to 2.30c; fire box, 2.30c to 2.50c; refined iron bars, 1.95c to 2.10c; soft steel bars, 1.80c to 2c; steel sheets, in carloads, New York, No. 28 black, 2.90c to 3c; galvanized, 75 and 2½ off.

BIRMINGHAM, ALA.

May 19.

The past week has in all probability been the quietest the iron trade has witnessed for several years. There seems to have been absolutely no trading of any moment. Still, no reduction has been made by what are termed association furnaces. It is argued by such makers that with the present frame of mind buyers would be disinclined to buy at any figures, and as a consequence the wisest course to pursue is to wait until the purchaser is in a mood to consider seriously the question of arranging for his supply of metal the third quarter. In the meantime, with ample supplies of raw material, better transporation facilities, and with a fairly good supply of labor the production of iron continues about normal. All iron is being moved as fast as produced. Farming operations are beginning to interfere with furnace labor in some sections.

The coal miners at Virginia City are on a strike. The United Mine Workers recently organized that camp, and the owners of the property, the Alabama Steel & Wire Co., claim that as they have already made a contract with the miners for operating the mines, they will not now treat with the union with reference to the wage scale. The miners may remain out until a general wage scale for the district is agreed upon.

It is announced that the property of the Aetna Furnace Co., near Aetna, Ga., has been leased by T. T. Lewis and associates, of St. Louis, and that they will enlarge and improve it, putting the furnace in operation.

The Alabama-Tennessee Coal, Iron & Railroad Co. was recently incorporated under the laws of the State of New Jersey with a capital of $2,500,000. It is reported that some valuable coal properties in Alabama and Tennessee have been acquired and will be developed at once.

A large party of Baltimore and Richmond capitalists are expected in the district this week. Their object primarily is to look over the properties of the Alabama Consolidated Coal & Iron Co., and other investments in the South. The party will include several directors of the Seaboard Air Line Railway, who will look over the holdings of that company here.

The Metal Market.

NEW YORK.

OFFICE OF *The Iron Trade Review*,
ROOM 1909, No. 150 NASSAU ST., May 19.

Pig Tin.—Dullness of a most pronounced kind marks the pig tin market. Brokers of many years' experience say they never saw trading so quiet. Consumers seem to be well supplied, and new business could hardly be slower. This condition of affairs has made bearish interests active during the week, and as a result prices sagged off daily, today's closings being the lowest since the liquidation set in. The London market during the week was dull and lower, prices showing a decline of nearly £1 since our last report. Today's closings at the Metal Exchange were as follows: Spot to June, 29.40c to 29.60c. London closed today as follows: Spot, £133 12s 6d; futures, £132 15s. Arrivals at Atlantic ports for the month to date amount to 2,427 tons with 4,019 tons afloat.

Copper.—Taken as a whole, the market is without change. The demand continues light, with the unique situation existing of small companies selling below current quotations, and the larger interests holding the metal considerably higher than they. Casting is especially affected in the former respect, sales being made from 14c to 14¼c. Bullish manipulators derived great pleasure from action of the Calumet and Hecla Co., which during the week raised its quarterly dividend from $5 to $10 per share. London has been dull and lower, with purchases from America falling off as the year progresses. Closing prices at the Metal Exchange today, nominal, are as foilows: Lake and electrolytic, 14¾c to 15c; casting, 14½c to 14¾c. London closed today as follows: Spot, £62 17s 6d; futures, £62 7s 6d. Exports for the month to date aggregate 4,127 tons, against 6,867 tons for a similar period last year.

Lead.—Unchanged, at 4.37½c for 50 tons or more. St. Louis is 4.17½c, and London £11 16s 3d.

Spelter.—Is quiet and firm. Spot is 5.75c. St. Louis, 5.50c, and London, £21.

Antimony.—Cookson's unchanged at 7¾c to 8c; Hallett's at 7c. Other brands are 6¾c.

Quicksilver.—Still quoted at $47.50 per flask of 76½ pounds in lots of 100 flasks. London unchanged at £8 2s 6d.

Nickel.—In good request at 40c to 47c for large lots down to a ton, and 50c to 60c for smaller quantities.

CHICAGO.

OFFICE OF *The Iron Trade Review*,
1115 MONADNOCK BLOCK, May 19.

There is little change to report in the situation. Buying is light, but prices are firm. Little or no contracting is being done for future needs, consumers covering only for immediate requirements. The general market is marked with an apathy

similar to that afflicting the iron and steel trade. Our quotations are without change, as follows: Lake copper, carload lots, Chicago delivery, 14¾c to 14⅞c; smaller quantities, 15c. Pig tin, 31c; pig lead, 4.30c in 50 to 100-ton lots, and 4.32½c in lesser quantities; spelter, 5½c in carload lots, and 5¾c to 6c in lesser quantities; sheet zinc, 6¾c; antimony, 10¾c to 11c for Cookson's, and 9¾c for Hallett's. We quote old metals as follows: Copper wire, 12¼c; heavy copper, 12c; light copper, 11½c; heavy red brass, 12c; heavy yellow brass, 9c; light brass, 8c.

The Hanging Rock Region.

IRONTON, O., May 18.—The Foster Stove Co. will soon rebuild its plant and materially increase its capacity.

E. B. Wright and associates have purchased 1,065 acres of mineral lands near Little Etna, this county, and will develop the coal and limestone. The mines will be equipped with electric-mining machines.

The plant of the Ironton Tack Co. was destroyed by fire, May 13. Loss $20,000; insurance, $14,750. The question of rebuilding is undecided.

The Portsmouth Foundry & Machine Co. has the contract for the standpipes and a 225-foot stack for the Lorain Steel Co., Lorain, O.

The strike at the Harbison-Walker firebrick plants at Hayward and Firebrick, Ky., have been ended and all the men have returned to work, slight concessions being made.

Local capital is being interested in the organization of a company to establish a large plant here for the manufacture of a patent plow. It is said that sufficient stock has been taken to warrant organization.

The removal of the scales and boshes, and over 200 cars of stock from the Eagle plant of the Republic Iron & Steel Co. here, is taken as assurance that the plant is to be abandoned.

The strike situation at Ashland, Ky., is still unsettled and as a result the Ashland sheet mill, rod mill and steel plant and the Norton nail mills at Ashland, and the Kelly and Belfont wire and wire nail mills here are not turning a wheel.

When asked if the chances were good for a continued operation of the blast furnaces of this district, a manufacturer said: "No, not if the present rates for ore, coke and labor, and the low price of iron continue."

It is reliably stated that an option has been given, extending to June 1, on 52 percent of the stock of the Ashland Coal & Iron Co., whose properties comprise two blast furnaces, 22 miles of railroad and valuable mines. The option price is 150, the capital stock being $1,500,000. It is believed that the railroad may be disposed of to the C., H. & D. or the Detroit Southern.

Colonial Steel Company.

We are authorized by the Colonial Steel Co., of Pittsburg, to say that the statement recently published elsewhere that negotiations were pending for the acquisition of the company by the Crucible Steel Co. of America is entirely unwarranted. The company states that no such negotiations exist between it and any other company.

The record for unloading ore was broken Monday, May 18, at Conneaut, O., when the Pittsburg Steamship Co.'s steel freighter James H. Hoyt unloaded 5,300 tons in 3 hours, 56 minutes, four Hulett machines being used. During the last hour, men shoveled the ore so that it could be reached by the buckets, which removed every pound.

Concerning the report that the Parkersburg Iron & Steel Co., Parkersburg, W. Va., will make some very extensive improvements and additions, the company informs us that its plans are merely in contemplation and have not been definitely decided upon.

The Lodge & Shipley Machine Tool Co., Cincinnati, informs us that it does not intend to build as reported in newspapers. Mr. Lodge personally bought some land recently, but the company has no connection with the deal.

Negotiations for the building of vessels for the lakes and for the Great Northern R. R.'s Pacific lumber trade, mentioned last week, are still pending and in addition two ship building companies have been asked to make estimates on three 500-foot steamers for the lakes and for an oil tank steamer for Philadelphia parties.

The Labor Situation.

Strike Fever Serious at Chicago.

CHICAGO, May 19.—The strike epidemic is growing apace in this city, and almost every day additions are made to the ranks of those who have laid down their tools to force a settlement of their demands. Chicago has long been noted as the hotbed of unionism, and the arbitrary methods employed by many organizations at the present time to secure their demands are not only sounding the knell of industrial Chicago, but will ultimately result in the refusal of manufacturers in this city to treat in any manner with organized labor. Agreements are cast aside without any consideration, promises are repudiated, and strikes called wherever the unions see a chance of victory in the enforced idleness of their employers' shops. The number of manufacturers who move their plants to other cities because of their inability to get along satisfactorily with their employes grows greater each year, and the threats and determination of others to do likewise unless a halt is called soon on the demands of labor are seriously alarming those interested in the welfare of this city. Several concerns that had decided upon extensive and costly improvements to their plants here, among them being the Allis-Chalmers Co. and the International Harvester Co., have now definitely abandoned their plans in this respect and instead will increase the capacity of their shops in other cities.

Another example of the little dependence that can be placed on the agreements made with some unions is to be found in the strike declared last Monday by the local union of blacksmiths' helpers and the sympathetic strike declared in their behalf by the blacksmiths. Under date of April 30, the business agents of the helpers' union entered into an agreement with the Chicago Metal Trades Association, which provided "that the differences between said bodies (the Chicago Metal Trades Association and the Blacksmiths' Helpers International Association of Allied Metal Mechanics) including all matters of wages, classification, hours, conditions of labor and any and all other differences existing, be submitted to a joint committee of three members of each body who will meet and settle, if possible, said questions. Any of said matters not agreed upon by said committee shall be submitted to a board of arbitration, to be composed of three or five members; the decision or findings of either the joint committee or board of arbitration to be binding on both parties. Pending such settlement or arbitration there shall be no lockout or strike." The committees appointed had agreed upon all the questions at issue with the exception of the subject of wages, and this question they decided to refer to the arbitration committee. The Chicago Metal Trades Association appointed its members and waited for similar action on the part of the union. Instead of fulfilling their part of the agreement, the union decided to strike until their demand for 27 cents an hour was granted, and to aid them in securing this, a large number of blacksmiths, all of whose demands had been adjusted—these having been given the nine-hour day and the 30 cent minimum—went on strike also. All the shops of members of the Chicago Metal Trades Association are affected, and probably about 1,000 men of these trades are now idle.

During the week the electricians and cranemen employed in the Fraser & Chalmers works of the Allis-Chalmers Co. handed in wage demands which were deemed unjust and were refused. A strike was called and upon the refusal of other employes to take the strikers' places, the plant was shut down. The electricians demanded an increase of from 21 to 25 cents to 30 cents an hour, and the cranemen wanted 27½ cents in place of 19 to 21 cents an hour. The company offered to compromise on 27½ cents for the electricians and 23 cents for the cranemen, but this was refused by the business agents of the men.

The strike at the Deering Harvester Works is ended, the company having agreed to recognize the union, grant the nine-hour day and adjust the other demands of the union after its employes returned to work. This they agreed to do, and conferences are now in progress between officials of the company and representatives of the union.

Strikes have also been declared at the Lassig Works of the American Bridge Co., affecting 1,100 men; among the engineers and firemen at the stockyards; among the boys em-

ployed by Crane Co.; and in the plants of the John Mohr Boiler Works, South Chicago; the Union Drop Forge Works; H. W. Caldwell & Sons Co.; Harvey Automobile Works, Harvey, Ill., and among the armature winders, electrical machine repair men and their helpers employed in the shops of the following companies: Gregory Electric Co.; Guarantee Electric Co., Schureman & Hayden; Becker Bros.; Aaron Electric Co.; Peerless Electric Co.; Pyle National Headlight Co., and the National Stamping Co. First class armature winders and machine repair men are asking for 39 cents an hour; second class armature winders and machine repair men, 28 cents an hour; helpers, 20 cents an hour. Their original proposal provided that no sympathetic action on any labor dispute shall be taken until after the grievance in question has been submitted to arbitration. Some of the strikes among these plants have been settled, and others are being arbitrated either by officials of the respective companies or by committees representing the organizations of which the firms may be members.

The Chicago Metal Trades Association reached an agreement today with the brass workers, molders, platers, polishers and buffers employed by its members, it being practically the same as that made some little time ago between the Brass Manufacturers' Association and its brass working employes. It is reported that satisfactory progress is being made with the committees representing the machinists and metal workers. All negotiations with the business agents of the blacksmiths' helpers have been called off, and officers of the national body have been called in to settle the question.

At the meeting of the Cook County Founders' Association, held May 14, the following officers were elected to serve one year: President, J. C. Clifford, L. Wolf Mfg. Co.; vice president, Z. T. Miller, M. & D. Range Co.; treasurer, A. M. Eddy, R. M. Eddy Foundry Co. The following executive committee was also selected to serve for two years: James A. Brady, Hecla Iron Works; Erastus Foote, Dearborn Foundry Co.; H. K. McLean, Link Belt Machinery Co.; A. E. Coleman, Chicago Ornamental Iron Works. The constitution provides that the fee for membership in the association be $10 and the annual dues $25. No person, firm or corporation is to be elected to membership while engaged in a strike; nor will any member be allowed to resign or withdraw from the association during the existence of a strike or general lockout declared by the association, or pending the settlement of labor difficulties between an applicant and his workmen, nor in anticipation of any of these difficulties, nor pending the investigation of charges making the applicant liable to expulsion.

(Special Telegram.)

CHICAGO, May 20.—The agreement entered into yesterday between the brass workers, buffers, polishers and platers and the Chicago Metal Trades Association, provides for a nine-hour day except in June, July and August, when the proposition of a 54-hour week shall depend on its endorsement by the workers in a referendum vote. It will be granted to shops demanding it. Those of the men working since Jan. 1 and getting 25 cents an hour are to be raised 10 percent; those getting between 25 and 28 cents are to be raised 5 percent. Those men who have been employed since Jan. 1 and not later than April, who are getting 25 cents an hour are to be raised 5 percent, while those getting between 25 and 28 cents are to be be raised 2½ percent. There is to be no discrimination between union and non-union men, and all disputes are to be settled by arbitration. This agreement affects only men employed by members of the association.

Vice President Summis, of Cleveland, of the International Brotherhood of Blacksmiths, has been ordered to Chicago to settle the strike among the blacksmiths' helpers that is tying up 50 to 75 shops.

Rolling Mill Wage Conferences.

The bi-monthly examination into prices and shipments in the iron bar trade in connection with the sliding wage scale was made Thursday last at Youngstown, and showed an average of shipments for March and April of between 1.70c and 1.80c, the same as at the two previous examinations. Puddling wages will remain therefore at $6.12½ a ton, or close to the highest wages ever paid.

The first conference on the iron scale has been arranged for Detroit, Tuesday next, May 26, the manufacturers being represented by James H. Nutt, W. L. Simonton and G. Watson French.

The conference on the tin plate scale, which began Tuesday of last week in New York, has been prolonged into this week, the desire evidently being to get the matter settled at the one conference. Ordinarily if the agreement is not reached in a few days the conference is adjourned, and it may be taken for granted that the manufacturers are particularly anxious to have the matter settled at once. The tin plate company is sold up tight to August 1, and is somewhat behind on deliveries. In the past three years the first half has been a busy one and the second a very light one. This year it looks as if the extreme activity would be prolonged well into the second half, with a much heavier production for the year than has yet been experienced.

Wage Agreement for Milwaukee Foundries.

The following is the agreement reached between foundrymen and molders in Milwaukee, in settlement of demands made last month for an advance in wages and the nine-hour day. Wages were advanced but the day remains the same:

MILWAUKEE, April 22, 1903.

We, the undersigned committee, representing members of the National Founders' Association in the Milwaukee district, and Iron Molders' Unions Nos. 125 and 375, do hereby agree on behalf of our respective organizations to be governed in the future by the provisions of the following articles of agreement:

1. That on and after May 1st, 1903, the minimum rate of wages for molders in the foundries shall be three dollars ($3) for floor and two dollars and eighty cents ($2.80) for bench molders per day of ten hours, and that all molders working by the day, whose wages on March 1st, 1903, were equal to or greater than the above rates, shall receive an increase of 10 cents per day over the wages paid them on March 1st, 1903.

2. The rate paid for piece work shall be such that a competent molder shall earn at least the minimum wages.

3. Any foundry which runs over-time except in cases of accident or causes beyond control not consuming more than 30 minutes' time, shall pay to the molders time and one-half; double time shall be paid for Sundays and the following holidays: New Year's day, Memorial day, Fourth of July, Labor day, Thanksgiving day, Christmas day.

4. That there shall be no increase in the total number of hours at present allowed on set time work, which hours are understood to include over-time; and in setting time on new jobs it shall be clearly understood between employer and molder whether the time is straight time or includes overtime, and if so, how much.

5. It is agreed that should the foreman or other representative of the employer, fail to adjust any difference respecting output or other matter with the molder or failing to agree with him the shop committee or representative of the unions, it shall then be submitted for decision to a standing arbitration board composed of three representatives each of the foundrymen and the Iron Molders' Unions Nos. 125 and 375, the decision of the arbitration board to be final and accepted in good faith by both parties. Pending this decision, there is to be no change in the situation as it stood immediately before the question was raised, at the instance of either party.

6. Regulation of the apprentice system so as to compel apprentices to complete their term of four years, shall be mutually enforced.

7. It is hereby mutually agreed and understood that in case of any arrangement being made by the officers of the International Iron Molders' Union of North America and the National Founders' Association, having any reference to the question of differentials, now under consideration by the officers of either association, it shall be made a part of this agreement, and that all parties hereto shall be bound by any national agreement that may be made, or entered into between the representatives of both associations at any time during the life of this agreement.

8. This agreement is to continue and be in force until

April 30, 1904, and unless 30 days previous thereto notice of a desire to change any of the conditions of this agreement be given by either party thereto, then this agreement is to continue and be in force until April 30, 1905.

The parties hereto pledge their best efforts to carry out this agreement in good faith, there shall be no change made in the shop practices and customs as they generally prevailed in the past year in the foundries in this district; but this shall not be construed to prevent any improved practices which may be mutually agreed upon as fair to both parties, and with the understanding that during the life of this agreement the Iron Molders' Union shall make no further demands upon the foundrymen.

New York Builders Organizing.

Decision to form a compact organization of employers in the building trades in Manhattan borough, New York, was reached on the evening of May 15. Employers to the number of 782, representing capital in the amount of about $500,000,000, took part in the meeting. The purpose to form an organization to deal with the labor unions in the building trades was expressed in the following, which had the unanimous approval of the employers:

Whereas, The present condition of the building industry makes it imperative that employers shall be made more secure in the conduct of their business, workmen more secure from interference with their opportunity to work, and the public generally more secure from interruptions to business, resulting from strikes or lockouts in the building trades; be it

Resolved, That the board of governors of the Building Trades Association arrange at once for a meeting of the executive committees of various employers' associations of the building trades, to provide ways and means for the creation of a central body of employers.

Following the passage of the resolution, the board of governors of the Building Trades Association met and decided to call a meeting of the executive committees of the various employers' associations in the building trades for last Tuesday evening. At that meeting further steps toward organizing were taken. When the association is fully organized, the settlement of the strikes which are holding back all building operations in New York will be undertaken in earnest. It seemed to be the unanimous sentiment of the men at the meeting of May 15 that the strikes must be settled in a manner to insure permanent peace in the building trades.

The sentiment of the speakers was that it was time that the decent and order-loving mechanic asserted himself and defied the arbitrary, tyrannical demagogue who tied his hands and drowned his voice; that the walking delegate was a parasite on the body public to be exterminated, and that it was the duty of the hour that employers in every branch of the building industry act in concert and make every legitimate effort, not alone for their self-preservation, but for the public welfare, to accomplish this end. They declared that it was not a question of wages or of hours, but as to whether irresponsible bodies of men were to be permitted to conduct the business of the employer, and in so doing make it impossible for him to execute his contracts and to discharge the obligations and responsibilities which he assumed, and to which the courts and the law of the land bound him. They said they believed that the extremes to which the unions had resorted and the manner in which they have repeatedly broken contracts made with their employers had alienated from them the sympathy of the public. They called upon the police and the magistrates to perform their duties unflinchingly. They pointed out the brutality of the assaults by strikers, the damage to property, the murders that had been committed in the name of labor, and which had gone unpunished. They asked that political ambition should not be permitted to pervert justice.

Brooklyn Employers Organize.

The Employers' League, which has among its members men who employ large numbers of men in various capacities in Brooklyn, N. Y., was organized May 15. The organization's chief purpose is the protection of its members against the increasing aggressiveness and demands of the unions, and the annoyance caused by the walking delegates.

The following resolutions were adopted:

Whereas, While we admit the right of all men to organize for mutual protection, and to appoint such officers as they may desire, to act for them, we do not admit their right to act for employers and to dictate how they shall conduct their business; and,

Whereas, Arbitrary and unreasonable demands have been made by the labor organizations of this city which, as individuals, we were compelled to accede to in the past, and these demands becoming more intolerant and unreasonable, we, the Employers' League of the Borough of Brooklyn, have combined for the mutual benefit of ourselves and our employes; and,

Whereas, a system of coercion practiced upon the employes by the labor organizations is obviously as objectionable to them as it is to our association; therefore, be it

Resolved, That we, the Employers' League of the Borough of Brooklyn, will permit no interference with our business by any individual or organization, and that no walking delegate or business agent shall be allowed to enter any shop or upon any of our work during working hours.

Union Machinists Decree the End of Piece-Work.

The International Association of Machinists, at its recent convention in Milwaukee, took positive stand against those employers who are endeavoring to establish an equitable basis of payment for work. July 1, 1904, was the date fixed on which all piece work must stop. It was decided also that the nine-hour day must be enforced. In the future in agreements between the local unions and manufacturers, a 54 or a 55-hour week will not be considered. Each day's work will be nine hours. The following demand was also adopted: "For one year from July 1, 1903, an advance of 15 percent shall be paid to each journeyman machinist now in the employ of the various firms. The minimum starting rate for any machinist shall be 38⅓ cents per hour. No manufacturer shall ask his employes to handle, or work the product of 'unfair' shops." An amendment to the constitution of the association provided that every man employed in a machine shop can be taken into the union. The union now includes 75,000 members, and this change in the constitution makes 125,000 other employes eligible to membership. James O'Connell, of Washington, D. C., was unanimously re-elected president.

Settlement with Erie, Pa., Molders.

The strike of molders at Erie, Pa., has been settled by arbitration. The advance in the minimum rate from $2.65 to $2.80 a day was granted as asked for, and piece prices are to be adjusted on a basis of $3 a day of ten hours. The horizontal advance of 15 cents asked for was not granted. General conditions are to remain the same as during the past year.

Labor Notes.

The molders on strike at the Chester Steel Casting Co.'s works, Chester, Pa., have accepted the terms of the company to pay a minimum wage rate of $3 per day of ten hours, and have returned to work.

Boilermakers in the Southern Pacific shops have been instructed by the officers of their union to remain at work until May 26th, pending an effort which is being made with the officers of the company to adjust the grievances.

About seven hundred inside bridge and structural iron workers at the plant of the Lassig Iron Works, Chicago, have gone on a strike, claiming that the company has been guilty of discrimination in discharging a committee which submitted demands for increased wages.

One hundred molders' helpers at Newark, N. J., are on a strike for an increase of wages from $1.50 to $1.75 a day.

Three hundred machinists of the Berlin Machine Works, Beloit, Wis., have struck for a nine-hour day, an increase in wages and recognition of the union.

Cleveland union brass workers to the number of about 300 went on a strike May 15th for an increase of 25 cents per day in wages. The companies at whose plants the strikes occurred are the Glauber Co., the Bishop & Babcock Co. and the Cleveland Bronze & Brass Co. The manufacturers say it would do very little good to grant the present demands as the men would soon be asking for another increase. Cleveland is an important center of the brass manufacturing industry.

THE IRON TRADE REVIEW

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IRON TRADE CONDITIONS.

Recent comment by those least informed concerning the iron trade finds unfavorable conditions. It is well in many respects that there is sharp public scrutiny of every phase of industrial operations. Possibly this is one redeeming feature in the close relation the past four years have brought about between Wall Street and industry. The fraction, whether large or small, that is always working to depress the industrial stocks is quick to scent the first appearance of an unhealthy symptom. Often the reports are untrue or only half true—as in connection with the break in wire prices two years ago; but with all the harm done by the indefensible methods of the bear contingent, they have done an unintended service. Nothing has been more conspicuous in the iron trade, since prices cut loose in the boom of 1899, than the sentiment of caution and restraint that has accompanied all the advances that have been scored. Since the sharp price reaction of 1900 the prediction has come out regularly that the top has been reached and that demand must fall away markedly. Throughout 1901 and 1902 and continuously in the present year, there has been enough pessimistic sentiment abroad in the trade to temper even such conditions as existed last year, when every manufacturer in every department of the trade was behind orders, with no early prospect of overtaking them.

Now, after more than a year of struggle against the hamperings of the railroads, the iron trade has come to the point where business can be done without friction. In the foundry trade, after nearly 18 months of large importations of iron, melters are getting the domestic iron due on their contracts, and the high premiums paid for some months on a relatively small proportion of the iron going into the cupola, have disappeared. Both buyer and seller want to find the basis on which new contracts can be made. In the early part of 1902 Southern No. 2 foundry iron was bought at $12, Birmingham. Nominally that price prevailed for several months of last year; but furnaces that had iron to offer sold at $14 in the latter part of March, at $15 to $15.50 in April, and in May $16 and as high as $17 was paid for early delivery. At prices ranging from $14 to $16 much of the Southern No. 2 that has been shipped in the past four months has been billed to consumers. It is seen, therefore, that the prices recently made by independent Southern furnaces do not represent reductions below the price of iron that has gone into the bulk of the castings produced in the past twelve months. Even at $15.50 Birmingham, the basis is really higher than much of the contract iron shipped between May 1, 1902, and May 1, 1903.

The principal changes that have come over the situation are the relief from freight congestion and the increase in pig iron output. Even with as high rate of pig iron production as 383,897 tons a week on May 1 all the iron made is going into consumption, while stocks showed a decrease of 5,000 tons between April 1 and May 1. As compared with May 1, 1902, which was the high point in active pig iron capacity last year—352,064 tons a week—the furnaces on May 1, 1903, showed an increase equivalent to 1,500,000 tons a year. Foundry wage settlements indicate, moreover, that demand is well sustained, molders this spring receiving most of the wage advances asked for, and the members of the craft are well employed. In the past month, it is true, there has been some falling off in inquiries for castings. How much of this is due to strikes in various consuming trades and how far it is temporary, remain to be seen.

The steel works of the country are fully employed, and the finishing mills in some lines, notably rails, wrought pipe and structural steel, are booked for months to come. Unless some marked reversal of conditions comes, as through crop failure (here all indications now are to the contrary), the full operation of mills to the end of this year seems well assured. Consumption, as shown by the pig iron statement and by the condition of the labor market, is enormous. Labor troubles are making some inroads upon it, particularly in structural lines, and it appears that building for investment is somewhat curtailed by high prices. But so far as distinctly unfavorable conditions or indications in the iron trade are concerned, these are yet to be developed.

AN UNUSUAL INJUNCTION PETITION.

The action of Judge Dickinson of the District Court at Omaha, in granting a temporary injunction against the Business Men's Association of that city, is like the recent decision which for a time prevented employes of the Wabash Railroad from striking; that is, it does not pass upon the merits of the pending controversy. It is easy to make charges and often not very much more difficult to secure a temporary restraining order, the courts usually holding that it is well to prevent action, which may be destructive of property or other interests, until an investigation of the truth of the

charges can be made. Time is thus given for sober consideration and sometimes the parties restrained conclude, as did the Wabash employes, that it will not be wise for them to do, after the removal of the injunction, what they had intended to do.

In the Omaha case, it is perfectly clear that the unions have made statements which they can not substantiate, as, for example, when they declare in their bill of complaint that the "Business Men's Association of Omaha is a local branch of an organization of national scope, which has for its object the destruction of labor unions; the defendants are members of this association, and they have formed a conspiracy whose object is the destruction of all unions." We know of no national organization whose object is the destruction of labor unions and we do not believe it will be possible for the unions to prove their assertion, which is positively denied by the Business Men's Association in a statement in part as follows:

"The association is purely a local institution and not connected with any organization outside of Omaha. Furthermore the association is not formed to crush organized labor. As a rule the unions have been recognized, but the word 'recognition' has been subjected to a new definition by labor agitators, until it has been made to represent an idea far beyond its original meaning. It now means the entire submission of the employers to dictates of the labor unions. If it be true that 'recognition' involves the life of the union, it is no less true that the acceptance of labor's definition of the term involves the life of the business interests. For the first time in the history of Omaha the combined force of organized labor is resisted by the combined force of organized business men, contending for what they believe to be right.

The unions further charge that the Business Men's Association has resorted to the boycott to force persons and firms into its organization. It certainly seems strange to hear of a labor organization asking to have an injunction issued against boycotting; but, inconsistent as this action may be with the usual policy of labor union, the injunction ought to be made permanent, if the charge can be established by evidence. The boycott is a hateful thing, no matter by whom used, and we do not believe that the business men of Omaha would welcome a decision which would permit boycotting, to which, in the statement to the public, they say they are unalterably opposed. Until the conclusion of the court's investigation of the real facts in this case and the announcement of its decision, the most important feature of the litigation is not, as many newspaper editorials indicate, that a temporary injunction has been granted, but that the united labor unions of a large city have asked that business men been restrained from using a weapon which has in the past been exclusively wielded by strikers.

The injunction really reads so much like a parody of some of the familiar injunctions issued against labor unions, as to raise the suspicion that the attorney of the unions constructed his petition by remodeling one of these well-known court orders and reversing the names of the parties concerned. The right of employers to select the class of men they employ is not to be questioned; but certainly associations of employers are not justified in coercing other employers who do not choose to affiliate with them or to do as they do.

LAKE SUPERIOR IRON MINES.

There is increased activity in the mining district about Baraboo, Wis. Several thousand tons of ore have recently been mined by the Deering and other interests, and are awaiting shipment. Eight large farms have recently been purchased by mining companies.

The Lake Superior Iron Co. is making arangements to celebrate its fiftieth anniversary at Ishpeming, Mich. June 24th has been fixed upon as the date, provided it will be agreeable to the Eastern interests of the company. Peter White, of Marquette, will tell the story of the early mining on the Marquette range, and several other addresses will be made. There will also be a barbecue and other interesting features.

The Meteor mine, Gogebic range, which has been operated by Corrigan, McKinney & Co., for four years, will be closed by June 1. The ore is silicious and the property has not been very profitable. It was opened in 1890, being known as the Comet, and was operated for five years. It was then closed four years. The total output up to close of 1902 was 150,624 tons.

The abandoned shaft No. 3 of the Commodore mine of Corrigan, McKinney & Co., on the Mesabi, is to be put to use. The shaft is in rock, and in the earlier days of the development of the property it was intended to make it one of the active working shafts, but for some reason it was allowed to fall into disuse and other shafts were put down in the ore.

Machinery Manufacturers Visit Cincinnati.

A number of prominent manufacturers will meet in Cincinnati this week to note machine shop practice, also the methods in vogue in that city in dealing with employes. The visitors will be the guests of the Cincinnati Metal Trades Association and will be received by a committee from that association, consisting of William Lodge, H. M. Norris, S. P. Egan, E. S. Hargrave and P. G. Marsch. They will arrive Thursday and remain until Saturday. A banquet will be given in their honor Thursday evening. Considerable time will be spent in visiting manufacturing plants. Those who will be present are: Chas. E. Hildreth, Worcester, Mass.; W. P. Egan, Chicago; H. M. Latham, Chicago; F. P. Ide, Springfield, Ill.; W. D. Sayle, Cleveland; W. Grant King, Buffalo; F. E. Wuerpel, St. Louis; Antonio C. Pessano, Detroit; G. W. Watts, F. C. Wheaton, Toronto, Canada; C. F. Wieland, Milwaukee, Wis.; A. Falkenau, Philadelphia; F. D. Wanning, Derby, Conn.; F. A. Stillmann, New York; Fred A. Scheffler, Harrison, N. J.; Julian V. Wright, Dayton, O.; H. C. Hunter, New York; P. B. Kendig, Seneca Falls, N. Y.; Edward C. Wells, Quincy, Ill.; W. E. Griggs, Jamestown, N. Y.; F. K. Copeland, Chicago; J. Kirby, Jr., Dayton, O.

Creditors of the Economy Foundry & Machine Co., Syracuse, N. Y., May 18, filed a petition in involuntary bankruptcy. The business was adversely affected by strikes in other cities and difficulties in filling a contract with the government for dynamite shells.

It has been announced in New York that all differences between the factions in the Chicago Pneumatic Tool Co. have been amicably adjusted. A quarterly dividend of 1¾ percent has been declared instead of the former quarterly dividend of 2 percent. The settlement was reached at a meeting in New York, May 15. Although the company is earning considerably more than 8 percent it was deemed wise to reduce the dividend on account of the extensive improvements and additions that are being made.

Later Pittsburg Market News.

(Special Telegram.)

PITTSBURG, May 20.—A sale of 1,000 tons of Bessemer pig iron is reported, shipments from July to Ocotber, at $19.40 Valley furnace. The pending purchase by the steel corporation is expected within a fortnight. Furnaces continue to quote nominal prices on foundry iron, waiting until consumers are really ready to buy, when reasonable concessions will doubtless be made. The market is entirely healthy. Steel-making pig iron is scarce. Instances are reported where furnaces are being asked to ship June iron in May.

STANDARD SPECIFICATIONS FOR CAST IRON.

Dr. Richard Moldenke, secretary of the committee, sends a report of the meeting of the American Committee on Standard Specifications for Cast Iron and Finished Castings, held at Philadelphia on April 25. There were 23 members present and letters of regret were sent by 18.

Mr. Walter Wood, chairman, in his opening address reviewed at length the history of the movement toward better methods of judging cast iron and finished castings. He spoke of the action of the congress at Buda-Pest when this question was brought before it, and indicated the present status so far as the United States is concerned. Prof. Edgar Marburg, the secretary of the American Society for Testing Materials, explained the position of the committee in relation to the various phases of the general problem, and a general discussion followed, participated in by Messrs. Wood, Marburg, Colby, Cook, Field, Kinkead, Outerbridge, Saunders, Souther, Touceda, Zehnder and Moldenke. Representatives of blast furnaces and the buying interests alike desired the speedy consummation of this work of standardization; the varied requirements, limits of variation allowed, and occasionally very poor methods of sampling, most of which could be thus avoided, were touched on. On the subject of pipe it was brought out that very little difficulty would be experienced, as this subject was practically shaped up by the various associations interested. It would remain for this committee to adapt the results at hand to the requirements of international trade, and in this the assurance was given that the contestants for the world's markets are quite ready to co-operate.

The same was brought out for the car wheel interests. The railroad interests have long had the matter of car wheel specifications into definite shape, and as Europe is beginning to look more favorably upon cast iron wheels, for economic reasons, a sub-committee on this line of foundry product would be expected to take the work already done, and adapt it for international purposes, remembering that American practice should be represented in the specifications to be prepared.

Malleables, cylinders, electrical and machinery castings, as well as castings made from furnace iron, also came in for some discussion. It was brought out that there were many varieties of work which required no specifications, such as stove and furnace castings, as they were bought for purposes other than strength and quality.

It was the sense of the meeting that the matter should be gone into with a view of specifying clearly how cast iron should be handled in the testing machines, what tests were the best ones to make, and as much light to be given on the subject as possible. The elaborate tests of the American Foundrymen's Association were referred to and the specifications adopted by that association were explained by its secretary. It was shown that the actual limits for strength for the various classes of casting were not given in these specifications, as it was felt that the consumers and others interested besides the foundrymen should have a say in this. The American Foundrymen's Association would therefore welcome action on these matters by the International and American societies for testing materials, having made the investigations in question only with a view of bringing out the best methods of properly judging cast iron on its merits, and specifying how this should be done in the light of experience probably not available to others not in the actual performance of this kind of work.

It was resolved that all the work should be done by subcommittees appointed by the chair. The classes to be taken up being as follows: Pig iron, pipe, cylinders, car wheels, malleable cast iron, general castings, and methods of testing cast iron.

As it is important to have some outline of the work ready, for discussion at the coming convention of the American Society for Testing Materials, to be held at the Delaware Water Gap, July 1, 2 and 3, it is expected that the chairmen of the various committees will draw up memoranda of the specifications, as they understand them to be necessary. Then they can as soon as possible, send these memoranda to the members of their committee for criticism, revision and enlargement. After hearing from all the members, the chairmen will give their summary to the secretary of the general committee for preparation for the convention, as well as for transmittal to the full membership of the committee for further discussion and criticism. When all this matter is in, it will be referred back to the chairmen for discussion and final shaping up by the respective committees, and then reported to the full committee for adoption and transmittal to the American body for ratification and promulgation as the American specifications for the testing of cast iron and finished castings. It then becomes a matter for international conference. The following are the committees appointed by Chairman Wood:

Pig Iron—Edgar S. Cook, Warwick Iron & Steel Co., chairman; Hugh W. Adams, Sloss-Sheffield Iron & Steel Co.; George E. Eldredge, B. Nicoll & Co.; Frederick A. Flather, International Harvester Co., Chicago, Ill.; Wm. Gerhauser, Superior Charcoal Iron Co.; W. W. Hearne, Matthew Addy & Co.; W. G. Scott, J. I. Case Threshing Machine Co.; C. H. Zehnder, Rogers, Brown & Co.

Pipe—Walter Wood, R. D. Wood & Co., chairman; H. A. Croxton, The Massillon Iron & Steel Co.; J. K. Dimmick, Dimmick Pipe Co.; L. R. Lemoine, U. S. Cast Iron Pipe Co.; W. R. Webster, consulting engineer.

Cylinders—H. V. Willie, Baldwin Locomotive Works; P. man; J. F. Kinkead, American Locomotive Works; P. Kreuzpointner, Pennsylvania Railroad; E. R. Wood, Jr., R. D. Wood & Co,

Car Wheels—Dr. Chas. B. Dudley, Pennsylvania Railroad, chairman; Geo. M. Davidson, C. & N. W. Railway; R. Job, P. & R. Railroad; Wm. W. Lobdell, Lobdell Car Wheel Co.; A. A. Outerbridge, Jr., Wm. Sellers & Co.; C. W. Sherman, Pennsylvania Malleable Co.; A. W. Slocum, Keystone Car Wheel Co.; C. H. Vannier, Griffin Wheel Co.

Malleable Cast Iron—Stanley G. Flagg, Jr., Stanley G. Flagg & Co., chairman; H. E. Diller, Western Electric Co.; Dr. Richard Moldenke, American Foundrymen's Association; S. H. Stupakoff, German-American Society of Technologists.

General Castings—Thos. D. West, Thos. D. West Foundry Co., chairman; Jas. A. Beckett, W. A. Wood Mower & Reaper Co.; L. M. Fenner, New York Air Brake Co.; P. S. Hildreth, consulting engineer; A. E. Loudon, Associated Foundry Foremen; R. S. MacPherran, Allis-Chalmers Co.; David Reid, American Machine Co.; W. M. Saunders, consulting metallurgist; B. Viola, German-American Society of Technologists.

Testing Cast Iron—Henry Souther, consulting metallurgist, chairman; Jos. W. Bramwell, Falkenau-Sinclair Machine Co.; W. DuComb, Riehle Bros. Testing Machine Co.; H. E. Field, Farrell Foundry & Machine Co.; Prof. Wm. K. Hatt, Purdue University; J. C. Henshaw, N. S. Bartlett & Co.; Prof. G. Lanza, Mass. Inst. of Technology; Edward Schroeder, with Dr. Chas. F. McKenna; Prof. H. W. Spangler, University of Pennsylvania; Enrique Touceda, consulting metallurgist.

The chairman stated that all the various sub-committees should be called together promptly by their respective chairmen so as to prepare specifications covering the requirements of the different classes of materials. As soon as these are ready they are to be sent to the secretary of the general committee, who will have them put in type and distributed to the different members of the general committee for criticism, revision or enlargement. Any replies that are received will be referred back to the appropriate sub-committee for further consideration and to draft final specifications to be voted upon by all members of the general committee, for their adoption and promulgation.

The increasing demand for Christensen air brakes and "Ceco" electrical machinery has made a change of organization necessary, and the owners of the stock of the Christensen Engineering Co. have organized the National Electric Co., and the assets, good will, etc., of the former company were transferred on May 16 to the National Electric Co. The purposes, ownership, management and control of the new company are identical with those of the old.

The foundry of the Brightman Furnace Co., Cleveland, was destroyed by fire on the night of May 19. The loss is about $3,000. The work of rebuilding will begin at once.

MAYOR JONES AND THE MOLDERS' UNION.

It was announced in daily newspapers a few days ago that the Toledo, O., Iron Molders' Union had authorized its delegates to the Central Labor Union to say that if the S. M. Jones Co. has not by July 1 a foundry of its own in operation, the Iron Molders' Union will raise funds by popular subscription, build a foundry and present it to the company. In reply to a request for an explanation of this rather remarkable announcement, Mayor Jones, president of the company, replies as follows:

To the Editor:

To your request that I say something about the relation of the S. M. Jones Co. with the Molders' Union of this city, I reply that the satirical statement to the effect that if our company "did not have a foundry in order by July 1 the Molders' Union would solicit subscriptions and erect one and present it to the company" was not endorsed by the Molders' Union, but, as I am reliably informed, was the statement of one member. It was one of the results of an attempt of the Molders' Union to place the S. M. Jones Co. on the "unfair list" for the reason that we are buying our castings from the Baker Brothers, of this city, a firm with which the Molders' Union have had trouble for the past year, though the only difference between the Molders' Union and the Baker Brothers at the present time is the question of unionizing the Baker foundry, they having granted all that was asked for in the way of wages, hours, etc.

Our company has always felt a desire to be right up at the head of the procession in the effort to bring about better social conditions for employers and employees. Personally, I am thoroughly convinced that there can never be peace for a few of us until there is peace for all of us; there can never be prosperity for a few but with opportunity for prosperity for all. I am a thorough believer in the idea of democracy and the equal brotherhood of all men. I believe that industry is to lead the people forward to higher planes of living where they will realize and make possible and practical the working out of the principle of brotherhood in business and in government.

For some years we have been doing the best we know to make a practical application of these theories to our business. Nothing has been further from our thought than to claim superior virtue because of these efforts. We have simply tried to keep at peace with ourselves, to do as we would be done by, and, in doing this, we have for years been running an eight-hour establishment which is, so far as we know, the only eight-hour shop of the kind in the country. We have a machine shop and a blacksmith shop and a third shop where we manufacture pumping rods, pumping powers and other oil well appliances. Outside of the government shops, we do not know of an eight-hour machine or blacksmith shop in the country. As we do not believe in the aristocracy of labor implied in the words skilled and unskilled, we have steadily endeavored to raise the standard of common labor, which for years has not been paid less than $2 for an eight-hour day, and our minimum at present for common laborers who have been a year with the establishment is $2.10, while we pay for skilled labor about the rate prevailing in other shops for longer hours.

The Molders' Union, however, evidently because of our efforts at humanizing the social relations about our factory and because of the further reason that I am in public life, have reasoned that as a war measure a blow at the S. M. Jones Co. would be the most effective way to bring about a settlement of their troubles with the Baker Brothers. And this may be true; I do not know. In the past, realizing that we did not have charge of the foundry where our castings were made, we have sought to protect ourselves against this kind of attack by inserting in the contract that our work should be done by union labor. The clause was inadvertently omitted when the present contract was let in January. Being called upon by representatives of the Molders' Union subsequently, I sought to act as mediator and settle their difficulty with the Bakers, and failed. Reporting to the Molders' Union that I had failed, I said: "Now, if you have any grievance against our company, we will submit to settlement by arbitration." The next thing that I heard about the matter was a notice, which I read in the papers, that the Central Labor Union, acting upon the request of the Molders' Union, had placed the S. M. Jones Co. on the unfair list. I wrote a note to the Central Labor Union calling attention to the circumstances and our willingness to arbitrate, and that body appointed a committee to settle the matter. The matter was left to arbitration, and the arbitration committee reported unanimously that the S. M. Jones Co. had not been unfair, but, on the contrary, had been exceedingly fair towards organized labor and that there was no cause for action. This report, the Molders' Union refused to accept and certain individuals have continued the warfare, as indicated by the statement to which you refer.

I have no complaint to enter against the Molders' Union, or any other union. Trade unions exist because society is living in a state of warfare. I do not believe in war at all. I am a man of peace. War knows nothing of fair measures and does not desire to. "War is hell;" and it is the ambition of warriors to get the advantage of the enemy in any way possible by any sort of subterfuge, deceit, lying, fraud, or any method, however unworthy, that will give to one side an apparent advantage over the other.

I believe that we are passing through an interesting epoch in the history of the movement towards a more righteous social and political order. We all have much to learn, and while I can see that trade unionism has been an agency that has done much to aid in the education of working men, the institution has yet much to learn in order to get rid of the tyrannical methods of the old world ideas of government and adapt itself to the modern and American idea of democracy and the equal brotherhood of all men, including those who are outside of the union as well as those who are in. But inasmuch as I believe in *all of the people*, I have faith to believe that the leaders of the trade union movement will open their eyes to the inevitable, and broaden and Americanize and humanize their platform and their principles to such an extent that it will seek to accomplish its ends through the methods of love and peace instead of through the agencies of hatred and war.

Very sincerely yours, SAMUEL M. JONES.

Toledo, May 11, 1903.

A Patent on Cast Iron Alloys.

A United States patent has been taken out by George Grunauer, of Berlin, Germany, on the manufacture of cast iron alloys. The invention relates to processes of producing an alloy of cast iron and nickel, and has for its object a product of greater strength and malleability than ordinary cast iron. As is well known, cast iron possesses only in a very small degree the property of being wrought. Its elasticity is comparatively small, and as compared with wrought iron cast iron is very brittle and of less tensile strength. To obviate these disadvantages, this invention consists, essentially, of adding nickel to the melted cast iron as it leaves the cupola. An alloy is produced which is claimed to resemble wrought iron in its properties much more closely than ordinary cast iron. The addition may be made in various ways. Thus solid nickel may be placed in the ladle and the liquid cast iron poured upon it, or nickel and cast iron, both in a liquid state, may be run together. One-half to forty percent of nickel may be mixed with remelted cast iron as it flows from the cupola-furnace, and an alloy thus obtained is said to readily admit of being worked, suffers much less from oxidation, and takes a higher polish than cast iron. The inventor says that the fluidity is also considerably increased by the addition of nickel to the iron and as the addition of nickel greatly improves the quality of the iron, the employment of low grade pig iron and scrap is rendered possible. Thus the practical importance of such an alloy is obvious.

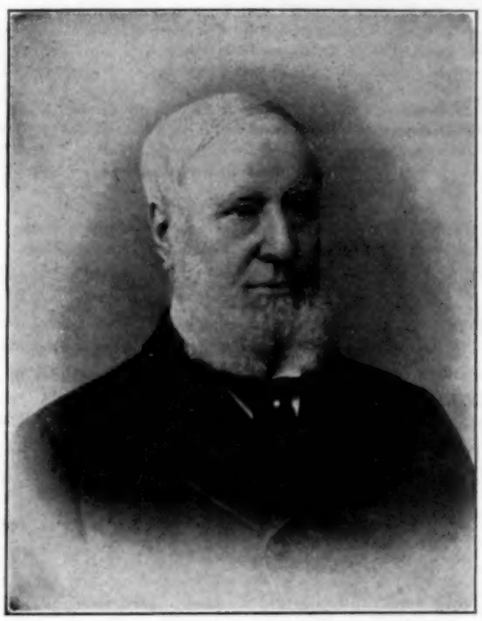
The improved product having greater strength, castings may be reduced in size, not only reducing the cost, but also reducing the weight.

The Baldwin Locomotive Works, Philadelphia, is turning out more than six locomotives every day. In April one hundred and ninety-one engines left the Philadelphia plant. The estimated value was about $2,500,000.

DEATH OF BENJAMIN F. JONES.

Benjamin Franklin Jones, Sr., founder of one of the greatest manufacturing concerns of the country, now the Jones & Laughlin Steel Co., died at his home in Allegheny at 2:25 a. m. May 19, in his 79th year. Although he had been ill for ten days, the end came very unexpectedly. Until very recently, Mr. Jones went to his office daily and was engaged actively as a member of the board of directors of the company. On the day before his death it was announced that on May 21 he and Mrs. Jones would celebrate the 53d anniversary of their wedding.

Benjamin F. Jones was born at Claysville, Washington County, Pa., August 8, 1824. His ancestors for several generations were also born in Pennsylvania. On his father's side he was of Welsh descent. His father, Jacob A. Jones, was born in 1776 in Philadelphia, and died at Rochester, Pa., at the age of 96. His mother was of Pennsylvania Dutch descent and was born in Franklin County, Pa. When thirteen years of age he removed with his parents to New Brighton, Pa., where he received an academic education. In 1843 he left his home and went to Pittsburg to begin a business career. The canal business was in those days very important in that city, and



B. F. JONES, SR.

young Jones' first employment was as assistant shipping clerk at no salary in the Pittsburg office of the Mechanics Line of Canal Boats. The young man's ability and industry were soon recognized by Samuel Kier, the chief owner of the canal boat line. When he established the independent line of section boats, one of the first of this class to run between Pittsburg, Philadelphia and Baltimore, and so constructed as to be adapted to use on either railroad or canal, he appointed Mr. Jones, not yet 21 years of age, manager of both lines of boats, at a salary which at that time was considered very high. In 1847 Mr. Jones became a partner with Mr. Kier and operated the boat line until 1854, when the Pennsylvania Railroad superseded the old system of canals. Although his main business activity was afterwards in other lines, Mr. Jones never lost interest in transportation, and was for many years identified with railroad enterprises, as indeed he was up to the time of his death.

While still acting as manager of the canal boat line in 1846, Mr. Jones became interested in the iron business, and that year, in partnership with Mr. Kier, he purchased an iron furnace and forges in Westmoreland County. His furnace operations were successful from the beginning. In 1851 he purchased an interest in the American Iron Works, and established the concern with which his name has since been identified. These works were then being built by Bernard Lauth, and the firm name became Jones, Lauth & Co. In 1854 James Laughlin came into the firm and in 1857 the firm name was changed to Jones & Laughlin, Mr. Lauth retiring. The firm was re-organized in 1900 with a capitalization of $20,000,000, Benjamin F. Jones, Jr., succeeding his father as chairman, with Benjamin F. Jones, Sr., as a member of the advisory board. The Jones & Laughlin Steel Co. succeeded the partnership August 1, 1902, the capital having been increased to $30,000,000. Mr. Jones was elected a member of the board of directors, while his son was chosen president. From the beginning the partnership was engaged extensively in the operation of puddling furnaces and rolling mills, and early in its career blast furnaces were erected and operated. The three furnaces that were operated on the site of the present Eliza plant had a daily capacity of nearly 200 tons, and all the iron was puddled and finished in the mills on the South Side, Pittsburg, the firm having adopted the principle early in its career of finishing all material produced.

When it became apparent to American iron masters early in the eighties that the age of iron was passing and that the age of steel would take its place, it was decided to build a Bessemer steel plant. In 1884 one five-ton converter was installed. At that time the plant on the South Side contained 110 puddling furnaces, being then the largest iron producing plant in the country. The small steel plant proved very successful, and it was decided to increase the output. Two ten-ton converters were built, the first steel being made from them in August, 1886. As the output of steel increased the iron production diminished until today not one of the old puddling furnaces remains. In 1895 an open-hearth steel plant was built and in the following year enlarged. About four years ago the plant of the Soho Iron & Steel Works was acquired, and as the property included a blast furnace the company's supply of pig metal was increased. In 1898 it was decided to rebuild the Eliza plant. Three new furnaces were erected and the most modern of the four furnaces was rebuilt and enlarged. The three old furnaces were entirely dismantled. In addition to operating four stacks at the Eliza plant and the Soho furnace one stack and its numerous open-hearth furnaces, the company also operates a spike, rivet and bolt plant, a plant for the manufacture of chains, and mills which roll steel bars, rails, plates, sheets, structural shapes and all kinds of merchant shapes. Last year a new Talbot open-hearth furnace was placed in operation. The company has recently decided on the erection of extensive improvements, including two blast furnaces and four Talbot furnaces.

In the half century since Mr. Jones first became connected with the iron business in Pittsburg, wonderful development has taken place. Fifty years ago there was not a blast furnace in Allegheny County. In every step of progress Mr. Jones was an important factor. His furnaces were among the first to use Lake Superior ore and the company now owns important mines in the Lake Superior region. His firm was also among the very first in buying coal lands for making coke in the Connellsville region. When natural gas was discovered the company drilled its own wells and laid its own pipe lines. In all the enterprises of the company nearly 6,000 people are employed, and Mr. Jones was always most successful in maintaining amicable relations with his working men. He always took an active interest in public affairs and in the campaign of 1884 was chairman of the National Republican Committee. In January, 1885, the American Iron and Steel Association elected Mr. Jones its president, to succeed David J. Morrell. Mr. Jones was married on May 21, 1850, and in his domestic relations was most fortunate and happy.

On petition of three banks, creditors of the company, A. H. Commins has been appointed receiver of the Akron Machine Co., Akron, O. The company has been in business since 1890 and employs about 60 men. The Crucible Steel Co. of America has instituted a replevin suit to recover 175,000 pounds of steel which is in possession of the Akron company, of which M. J. Gilbo is general manager. The receiver will operate the plant.

The Phœnix Foundry Co., Syracuse, N. Y., has taken a lease of the plant of the Porter Mfg. Co., which has been idle for several years. The plant is now being repaired and new machinery will be installed by July 1.

PERSONAL.

C. E. Crowther has been appointed superintendent of the furnace division of the Northern Alabama Coal, Iron & Railroad Co., with headquarters at Talladega, Ala.

J. C. Barrett, superintendent of the furnaces of the Carnegie Steel Co. for the Youngstown district, was seriously and probably fatally injured at the Ohio plant on May 18. A bolt dropped 85 feet from the top of the stack and struck him on the head, fracturing the skull.

Michael Baackes, of Cleveland, for a number of years manager of what was known as the Baackes wire and wire nail works, will remove shortly to Germany, his native country, and will take up a permanent residence at Krefeld. Mr. Baackes will represent a number of American interests of which announcement will be made later.

Reference has been made in these columns to the expected resignation of Labor Commissioner Carroll D. Wright to accept the presidency of the academic department of Clark University at Worcester, Mass. Commissioner Wright confirmed the report of his proposed resignation last week. In commenting on the resolution of the State Federation of Labor at Davenport, Ia., criticising him and asking for the appointment of a trades union man in his place he said he had been frequently criticised by labor unions because he compiled and presented facts rather than arguments on labor questions. He added that by another year, as soon as he could put the affairs of the bureau in shape, he should be out of the way.

Baron Von Rheinbaden, Prussian minister of finance, accompanied by Commercial Councilman Boeker, an iron master of Prussia, and Friedrich Von Versen, deputy consul-general of the United States in Berlin, arrived May 15 in New York on the steamer Kaiser Wilhelm der Grosse. The visit is an unofficial one, the baron being here to study economic conditions and particularly to visit the centres of the iron industry.

A. C. Chase has retired from the presidency of the Syracuse Chilled Plow Co., Syracuse, N. Y., and his son, Carleton A. Chase, succeeded him. Col. Chase had been president of the company for 20 years.

C. H. McCullough, Jr., formerly general superintendent of the South Works of the Illinois Steel Co., South Chicago, has been made second vice president of the company. On Saturday night, May 16, the officers of the company and the departmental heads at the general offices and at the works gave a banquet to Mr. McCullough and George L. Reis, who succeeds him as general superintendent. Mr. McCullough was presented with a handsome gold watch and fob by the works managers.

The New York *Herald* has made a compilation from which it estimates that Andrew Carnegie's gifts to towns, individuals and institutions, chiefly for libraries, amount to nearly $100,000,000. Pittsburg has received $18,804,000. The distribution among the different countries is put as follows: United States, $68,517,472; Scotland, $17,713,750; Holland, $1,750,000; England and Wales, $1,354,500; Dominion of Canada, $1,016,500; Ireland, $315,000; Cuba, $252,000.

Henry E. Pridmore, Chicago, manufacturer of the Pridmore sand molding machines, advises us that the total sales of the machines made by him in the past month amounted in all to 110, distributed as follows: 29 machines for railroad castings, 12 machines for sectional boilers, 10 for pipe fittings, 9 for agricultural implement parts, 7 for cotton machinery parts, 5 for sewing machine parts, 4 for soil pipe, 3 for engine parts, 15 for special machinery parts, and 16 for miscellaneous work. A great many inquiries have been received in the past 30 days from manufacturers of heating apparatus, and during the month shipments of several sets of machines for soil pipe work and for various other purposes have been made to foreign countries, Great Britain taking the bulk of them. Inquiries from makers of valves and other fittings are also numerous, owing to the fact that the Pridmore machines are being used on this class of work by ten of the largest manufacturers in the country.

No. 3 furnace at the Woodstock Iron Works, Anniston, Ala., was blown out a few days ago to make repairs. No. 2 furnace has been undergoing repairs for some time. When the repairs are completed No. 3 is to have a capacity of 300 tons, and No. 2, 200 tons.

NEW ENGLAND FOUNDRYMEN'S ASSOCIATION.

The May meeting of the New England Foundrymen's Association was held at the Hotel Essex, Boston, Wednesday afternoon and evening, May 13. The vice president, B. M. Shaw, presided, and the program and arrangements were in charge of F. F. Stockwell, secretary. The following were present:

W. D. Ballard, Coburn Trolley Track Mfg. Co., Holyoke, Mass.
W. F. Savage, Taunton Iron Works, Taunton, Mass.
E. J. Lyon, Brown & Sharpe Mfg. Co., Providence, R. I.
Henry Souther, Hartford, Conn.
Robt. P. Cunningham, Deane Steam Pump Co., Holyoke, Mass.
Jos. L. Anthony, Weir Stove Co., Taunton, Mass.
D. F. Eagan, H. R. Pridmore, Chicago.
William H. Stafford, Condor Iron Fdy. Co., East Boston, Mass.
P. Shields, Shields Fdy. Co., Mansfield, Mass.
E. V. Hazard, Old Colony Foundry, East Bridgewater, Mass.
Fred W. Dixon, Taunton Loco. Mfg. Co., Taunton, Mass.
John Nelson, *Iron Age*, Worcester, Mass.
A. L. Lovejoy, Becker, Brainard Milling Mach. Co., Hyde Park, Mass.
Walter B. Snow, B. F. Sturtevant Co., Jamaica Plain, Mass.
J. E. Plimpton, J. E. Plimpton & Co., Norwood, Mass.
John Magee, Magee Furnace Co., Boston.
Harwood Wilson, Rogers, Brown & Co., Boston.
W. H. Coffin, Springfield Facing Co., Springfield, Mass.
C. Hitch, Jr., American Tool & Machine Co., Boston.
Walter M. Saunders, Chemist, 184 Whittier Ave., Providence, R. I.
William H. Baush, Baush Machine Tool Co., Springfield, Mass.
Harry V. Gibby, Condor Iron Fdy. Co., East Boston, Mass.
L. H. Baird, Pilling & Crane, Philadelphia.
Edward W. Beach, Manufacturers' Foundry Co., Waterbury, Conn.
R. S. Bosworth, Rogers, Brown & Co., New York.
Geo. H. Lincoln, Geo. H. Lincoln & Co., South Boston, Mass.
S. M. Thompson, Barbour, Stockwell Co., Cambridgeport, Mass.
Wm. Harvie, Vaughn Machine Co., Peabody, Mass.
W. H. Bense, Kinsley I. & M. Co., Canton, Mass.
J. F. Blauvelt, New England Butt Co., Providence, R. I.
Chas. A. Reed, N. S. Bartlett & Co., Boston.
Geo. H. Gibby, Condor Iron Foundry Co., East Boston, Mass.
Fred A. Hoyt, Barbour, Stockwell Co., Cambridgeport, Mass.
Chas. T. Colvin, Colvin Foundry Co., Providence, R. I.
M. F. Perault, Fitchburg Machine Co., Fitchburg, Mass.
James F. Lanigan, Davis Foundry Co., Lawrence, Mass.
Wm. C. Doherty, Doherty Bros., Lowell, Mass.
Geo. B. Buckingham, Arcade Malleable Iron Co., Worcester, Mass.

The Manufacturers' Foundry Co., of Waterbury, Conn., was elected to membership.

MODERN SHOP CONSTRUCTION AND OPERATION.

S. D. Leland, of the United Shoe Machinery Co., of Boston, read a paper under the title, "Interesting Points in Connection with Modern Machinery Manufacturing." It presented some results of the observations of the committee from the United Shoe Machinery Co. which visited many plants in the United States, gathering data to be embodied in the plans for the new shops this company has built. Copious extracts from the paper are given below:

In order to produce modern machinery successfully, it is necessary to make a better product and at a lower cost than your competitor. This certainly means a great deal in this hustling twentieth century. It means the best type of manufacturing building, with all the essential features of a home, good light, heat, ventilation and sanitary conditions, and the arrangement of the same for the particular line of machinery to be built; also immediate proximity to good transportation facilities and comfortable homes for employes.

Points in Shop Construction.

There seems to be but one general type of building for heavy work, the monitor type, that is so well adapted for traveling cranes and overhead light. For light work, however, there is a greater divergence in the style of buildings. Machine shops and foundries, as a rule, have not received the engineering study that many other lines of manufacturing buildings have. Most of the existing machine shops are the result of slow growth and many additions. This is true more especially of buildings suitable for light machinery.

One notable exception for heavy work is the Allis-Chalmers plant in Milwaukee. This plant is so arranged that the work takes a continuous course from office to shipping point. Pattern shop, and foundry are parallel to main buildings, and machine shops are run at right angles to the line of the other main buildings, ending in an erecting shop, which connects the ends of all machine shops and is parallel to foundry and pattern shop. The main shipping is done from the erecting room.

We understand that as additions are made to this plant, they will be extended in units equal in size approximately to buildings already up. The main buildings are about 700 feet long.

The General Electric Co., in Lynn, in one of its recent buildings at the River works, illustrates good lighting for heavy workshops. The roof is rather novel. It consists of saw tooth sections, running lengthwise of the building, having spans from 30 to 40 feet in width. While this arrangement is quite satisfactory, there are some objections to having so long valleys running lengthwise of the building. In order to get good drainage for the roof, it is necessary to pitch these valleys lengthwise of the building in sections, taking the roof drainage down through the columns. This matter of drainage of valleys is one of the troublesome features of saw tooth roofs. Another example of very good light in heavy construction is one of the mills of the Duquesne Steel Co., Pittsburg. The General Electric Co., at Schenectady, has used translucent fabric instead of sky lights of glass on the roofs, making a very pleasant light. The Fore River Engine Co., at South Weymouth, has used this fabric very extensively, especially in its mold loft. This fabric is made of fine wire netting, dipped in linseed oil, then dried sufficiently to completely fill up the squares with a film. The light passing through it is of a yellowish green tint.

A good illustration of one-story saw toothed buildings that have most excellent light are those of the Weston Electric Co., at Waverly Park, N. J. The Straight Line Engine Co., of Syracuse, N. Y., has one of the first buildings of this type in this country, and Prof. Sweet has written a great deal about it.

The De Laval Separator Co., Poughkeepsie, N. Y., the De Laval Turbine Co., at Trenton, and the Atlas Tack Co., at Fair Haven, are all good examples of this saw tooth construction. It seems to be very satisfactory to the people using it, though it is generally conceded that the valleys are hard to keep from leaking in a climate where there is much snow. There also seems to be considerable objection in very hot weather, as there is such a large roof area exposed to the southerly sun. They are usually constructed without side windows. The shape of the roof makes them very difficult to ventilate. The American Ordnance Co., at Bridgeport, and many weave sheds of cotton mills employ a type of saw tooth construction that has wide valleys between the teeth. It is practically a flat roof with large saw tooth sky lights. This style of roof very largely obviates the leakage, but not the excessive heat in summer. The Boyer Machine Co., Detroit, Mich., manufacturers of pneumatic tools, employs a type of building and roof that is very novel. It consists practically of two fairly low pitch roofs, on each side of which are thrown out what might literally be called saw teeth. They are very close together, about 4 feet. The glass is set vertically, looking toward the north, and glazed with very coarse corrugated, or ruffled ribbed glass. The light obtained is excellent. This same glass is also used in the side windows, and the light is very evenly diffused throughout the shop. To obtain good light in multi-storied buildings, the width of the buildings must necessarily be limited, with high studding, and side walls practically all glass. This style is much used in watch factory construction, especially the extremely narrow buildings of about 40 feet in width. The shops of the National Cash Register Co., of Dayton, O., are very good examples of light, width about 60 feet and glass from ceiling to floor. The additional glass from bench to floor seems to add very much to the general diffusion of light, and is quite a new feature in lighting machine shops.

Heating and Ventilation.

Heat and ventilation by hot blast indirect system seem to be meeting with general favor. The air by this system can be readily changed every twenty to thirty minutes. Good air is one of the most potent factors in reducing cost of production. It is often found necessary to supplement this system by more or less direct heat in the more exposed places; hot water in combination with the blast system is now used somewhat. The South Terminal Station is using successfully a combination of hot water and hot air heating. By this system, they not only force in air for heating and ventilation, but they exhaust the foul air, so the air is completely and mechanically changed every twenty minutes. The hot water is supplied to the heating chambers in the basement from the boiler house, and is kept in circulation by a fan circulating pump, more or less known as the Evans-Admiral system. There seem to be many advantages in this system over using steam. It does not appear necessary to mechanically exhaust the foul air in shops, as they are constructed in such a manner that it can readily be forced out around windows, etc.

A very interesting heating plant is that of the Pittsburg & Lake Erie Terminal Station at Pittsburg. All windows are supposed to be kept closed summer and winter, and all the air is supplied from a combination heating and ventilating blast system, taking air from the roof, passing it through a scrubbing machine, where the impurities are washed out, when it passes through a regular heating and blast system, passing through the building, heat being supplied by direct hot water, except in the main waiting room, which is dependent on hot air alone.

Factory Organization.

Having a modern shop, well adapted to the work, and employing a thousand hands more or less, the matter of organization is before us. In a plant of this size, the problem of organization is interesting and complex as well. The matter of direction of thousands of men in one enterprise resembles somewhat the organization of an army, but there are many tendencies to depart from the old practice of depending upon one man or general. The larger manufacturing establishments, those of the subsidiary companies of the United States Steel Corporation, for instance, call together the managers of their many plants several times each month. They dine with the executives of the company, as the company's offices at Pittsburg, and here is worked out the policy of each department. None of the managers are allowed to go forward on any radical change of policy, additional equipment, etc., without getting the sanction of this board. This idea is being adopted to quite an extent by very much smaller companies. A number of them arrange to have all heads of the departments lunch with the officers of the company each day, when the policy is more or less shaped, besides establishing a better fellow feeling amongst these heads of departments.

The National Cash Register Co., of Dayton, O., and the Bullock Electric Mfg. Co., of Cincinnati, are notable examples.

Cost, Records and Clearance House System.

Ten years ago, I doubt if 25 percent of modern machinery manufacturers could tell the exact cost of their product beyond the direct, or flat cost; and today I doubt if there are 25 percent of strictly manufacturing machine companies that do not have installed, or are trying to install, some form of cost system, aiming to get not only the complete cost, but the cost of each individual operation that goes to make up the finished product, including a correct apportionment of all manufacturing expenses. This matter of cost includes the piece work features, the regulation of wages, record keeping and location of any part, at any time, throughout its manufacturing stage. These cost systems differ with each shop, and very naturally each one appears to think that its own system is rather the best that is in use, especially for its own work, and should be adopted by many others. The matter of being able to locate any part at any moment in its course through the shop from a central station is carried out only by a few manufacturing companies, and, in fact, the National Cash Register Co. have a very complete system. They call it the clearance house system. The main point is to record every part as it passes through the clearing house between each operation, and work not actually being machined is stored in the clearing house, awaiting the orders of the different foremen. A system that can correctly locate any part, during any operation, in the production of two hundred millions of pieces annually, with over 20,000 distinct kinds of parts, is certainly an interesting point. This matter of card cost system, etc., can hardly receive justice in the few minutes that I have to discuss it.

Some Interesting Features.

A few interesting machines or appliances might be mentioned. Possibly many of you have seen Mr. Church's pneumatically operated automatic machinery at the American

Watch Co., that produces many of the main parts of a watch. One machine in particular drills 78 holes, many of them tapped and countersunk; the pieces are changed to six different chucks during the different operations. About 2,500 watches are turned out by this company daily. A complete watch consists of twenty-three jewels and 185 parts, on which there are 3,850 operations. Mr. Church is considered one of the most remarkable inventors in the world in the line of special watch machinery. He was one of the captains of industry invited to dine with Prince Henry. We hear a great deal about automatic machinery displacing operators, especially from our socialistic friends, yet the following figures go to show that they are not always right. Before this automatic machinery was introduced, the American Watch Co. employed 3,000 people, and had an output of about 1,700 watches a day. The introduction of this machinery enabled them to increase this output to 2,500 watches per day, and at the same time increase their working force by over 200 people. I think the National Cash Register Co. sum up the situation very clearly in their motto "Improved machinery makes men dear, their work cheap." I had occasion to speak to one of the operators at the watch factory, who informed me that he had worked continuously on one small watchmaker's lathe, for twenty-four years, doing a comparatively simple operation. He was apparently a very intelligent man. Another operator had been in their service for thirty-five years. I was quite interested to learn that quite a number of the different parts were not made to duplicate, but were machined together, or one piece "marked on," as is quite the thing to do on heavy machining. The assembling is done wholly by girls; they receive all of the parts in complete sets, and one girl can completely assemble thirty watches a day.

I doubt if many of us stop to think how much of a figure the carborundum and emery wheel is cutting in the production of machinery. The carborundum in the wheels made at Niagara Falls is produced by electric reduction. It is made from finely divided coke, glass sand and sawdust, treated with a direct current of 110 volts, 800 amperes, for about 36 hours, producing some very beautiful colored crystals of extreme hardness, that break with a very sharp fracture. These crystals are afterwards broken and graded, according to desired coarseness, and handled more or less like the ordinary emery wheel. We understand that this plant consumes something like 3,000 horsepower in making its wheels.

A very novel device is the use of a civil engineer's instrument in the shop of the Westinghouse Electric & Mfg. Co. It has an extensive iron platen where the generators are machined. This engineer's level is used to level up these heavy parts, and line them up ready for machining, which is wholly done by portable machines that can readily be bolted to this platen at any point desired.

Power Distribution.

The matter of power distribution in machine shops is receiving a great deal of attention. The leading electrical companies say that the time has nearly come when it is good engineering to drive each individual tool in machine shops by a motor rather than by driving in groups. We notice, however, that very few of these companies are carrying out their own recommendations to any great extent, except on what we consider in Massachusetts as heavy tools, with this exception: the Bullock Electric Co. are driving their new plant in Cincinnati wholly by individual motors. This shop, in fact, is quite a remarkable one in many ways. They have recently completed a wholly new plant. One's first impression on entering it is that he is in a great bazar. All the machine tools, traveling cranes and, in fact, all of the iron and steel work is painted with aluminum bronze paint, while all the standing finish and wood work are painted white. Each tool, even sensitive drills, is driven by an individual motor, thus doing away with overhead belts. These people you perhaps know are manufacturers of motors that are very largely used in machine tools on account of their multiple voltage system, which is well adapted to that class of work-variation of speed without loss of power.

We understand that in the new Pittsburg & Lake Erie R. R. Co. repair shops, each machine tool is to be equipped with an individual motor. It is a very common practice for heavy machine tools to be driven individually by electricity. The alternating current induction motor is looked upon with considerable favor. The full advantage of electric driving is not fully appreciated by those who already have mechanically driven plants. In laying out new manufacturing buildings, the fact of being able to place your power plant wholly apart from your manufacturing proposition, without being obliged to consider the matter of belt drive, allows greater latitude in placing your manufacturing departments in their relative locations with great ease, and too, it permits of comparatively small lines of shafting, and, being insignificant as to size, can be readily supplied in sufficient numbers to make the matter of power distribution one of comparative ease, especially if induction motors are used. The matter of attention is reduced to a minimum; in fact, these facilities are of such importance that the relative cost of belt driven and electrically driven is of secondary account.

Foundries.

The matter of making castings for modern machinery is one that has but recently received due consideration, there having apparently been less study put into this department than in almost any other in machinery building. The general jobbing foundry of New England is in rather a sad state, for which we consider the machinery manufacturer who buys his castings from jobbing foundries is very largely to blame. He forces a very low price and gets a remarkably low grade casting in consequence, yet, in light machinery work especially, the first cost of a number one casting should be considered of secondary importance where very much machining is required. The cotton and woolen machinery concerns and such people as the Brown & Sharpe Mfg. Co., and Walker & Pratt Co. at Watertown, make strictly first class castings. In this class, we would name the Draper Machine Co., of Hopedale, Saco & Pettee Machine Co., of Newton, Howard & Ballough, of Pawtucket, and the Mason Machine Co., of Taunton. These people today are resorting to the use of molding machines very extensively, with very satisfactory results, getting very difficult castings with unskilled help. By the use of this machine, many of our foundries have been able to bring their molders' union to a fair adjustment of wages, and its value is generally recognized in this direction. One of the most novel foundries to my knowledge is that of the Crane Co., of Chicago, who make pipe fittings, valves, etc. They have their cupola and charging floors in the sixth story and all cupola and charging supplies are stored in the basement and elevated to the floor. The castings when poured are carried around to an elevating carrier, taking castings to the charging floor where they are dumped into a cooling tower; then they settle to the floor, below where they are cleaned, rattled and passed along down through the machine shop; when they reach the bottom floor, they are completely finished and ready to go into finished stock. We found here a record of 110 men producing 65 tons of castings a day on miscellaneous pipe fittings, from ⅛-inch elbows up. This foundry required little or no space for molding machine floors, the sand being automatically mixed and conveyed to molding machines. The molding machines and molders occupy practically the whole foundry area, having only sufficient room for each molder to turn around and place his own half of the mold on an endless overhead carrier, with depending platform. Each mold was closed by a laborer, bound, weighted and poured while the molds were in motion. On arriving at the dumping point these molds were taken and slipped into an endless conveyer which took them up to the level of the cupola floor, where they were knocked out of the sand and dropped into the cooler as described before. The McCormick Harvesting Machine Co. has a foundry on this plan, as has also the Milwaukee Harvesting Co. This last, I think in many respects, is a model for light machinery foundries in this country. It is two stories in height, with the molding floor on the upper one, the basement being used largely for storage of castings and general foundry supplies. The Westinghouse people have an arrangement more or less similar to that of the Crane Co., of Chicago. Their endless moving platform passes along on track and wheels and they do substantially what the Crane people do in closing and pouring the molds while in motion, and in mixing and conveying their sand by machinery.

Laboratories.

It is getting to be a practice of the first class foundries with

which I am familiar to depend upon their chemical and physical laboratories in determining the cupola charges. Each lot of pig, as received, is analyzed, and from that, the chemist readily determines the cupola charges, thus insuring a much more uniform grade of work, and obviating practically all guess work and snap judgment on the part of the foundry foreman. This feature is certainly a great advance over the ordinary practice of the jobbing foundry. I think one of the most complete plants of this character is that of the Baldwin Locomotive Works. It is also remarkable for the amount of heavy work done in a multi-storied building. Locomotive tenders are built complete in the fifth and sixth stories, as well as a good portion of the boilers. This plant is situated in the very heart of Philadelphia, almost in the shadow of the city hall. It is curious to see how this company has monopolized all the streets passing through and around it. All the light trucking is done by horses and tip carts instead of by industrial railroads. This concern turns out 5 locomotives per day.

Features of Individual Foundries.

The class of work done by the Mesta Machine Co., West Homestead, Pa., is extremely heavy. This foundry is equipped with two 15-ton air furnaces, two 18-ton and two 30-ton air furnaces. All cast iron used in this foundry is molded in this style of furnace, no cupola furnaces being used whatever. These air furnaces are located so that the rear end of the furnace comes in the outer wall of the building. The stock yard is located alongside of the foundry and is served by 100 tons of traveling cranes. These cranes are so designed that they can be used for charging or loading the air furnaces. The full melting capacity of the furnace is taken advantage of and then a door sealed up with fire brick. These 30-ton furnaces are so arranged that they both can be tapped into one ladle to enable them to make a 60-ton casting of air furnace iron. I was informed that the particular advantages in this type of furnace over the cupola was that the furnace could be charged with the full amount for the day and the same could all be poured off at once, or in a very short time. This, of course, would be an impossibility when using a cupola furnace. These air furnaces are fed from a natural gas well owned by this company located very near the shop. So far they had succeeded in obtaining all the gas needed to run their whole plant from this one well. They anticipate, however, that the life of same is limited and is liable to give out at any time.

A large percentage of the castings made by this company are molded in some sort of pit in the ground. The general construction of these pits is of cast iron sides and ends; the sides, having a series of strips, are cast vertically on same for the purpose of retaining a parting wall; this parting wall being slid into place in different locations to determine the size of the pit. This, I was told, they found very useful and at the same time economical, as it saved constantly digging new pits and walling up the same.

A novel feature was seen at the Osborne Harvesting Machine Co.'s plant at Auburn, N. Y., in connection with air furnaces. Buggy ladles are used for serving the iron to the molding floors. To facilitate the use of these buggy ladles they have a cast iron walk of about 4 feet wide, with flanges cast on each end of about 1½ inches high, and these plates are cast in sections about 4 feet long; the same being used to make parallel walks lengthwise from the foundry as well as crosswise in the aisles. The rest of the foundry, other than these iron walks, is of ground floor. These flanges are to prevent the buggy ladles from running off the walks.

On a cupola they have a specially constructed trough as well as a tilting receiver from the trough. The object of combination is to not plug the outlet whatever, but to have the iron flow continuously from the time they start to melt. In this specially constructed trough, close to the body of the cupola, they have a trap. In the top of this trap there is a groove from which the slag runs away. The melted iron passes through the trap, or under the same, and out through the trough in the regular way. At the end of this trough they have, mounted on trunnion bearings, a tilted trough with a deep pocket in the center of same for the purpose of preventing the flowing iron from cutting out the bottom of this tilting spout. The spout is tilted so that one end is at an angle of about 30 degrees, the other end of the spout being lifted. The iron flows from the trough into this spout and from the spout into the ladle. When the ladle is filled there is an empty one on the other side ready to be filled. The spout is tilted in the opposite direction, thereby turning the course of the melted iron into the empty spout and vice versa. The trough is so constructed in the shape of a V with a flange cast projecting inwardly on each upper edge so that fire brick just fitted into the trough endwise. This we were informed was an advantage and a more economical way of lining the trough than by using plastic fire clay, as the life of the fire brick was much longer and it saved the bother of patching up every day, as the case would be if fire clay were used. This whole equipment seemed to be working very nicely and appeared to be a labor-saving device.

The McCormick Reaper Works, at Chicago, have a foundry in operation similar to that of the Crane Co., and they are able to get some remarkable outputs in their molding machine work. These people make mowing machine frames. Of these frames, containing 27 cores, 150 are produced in a day by eight men. One man devotes his time to setting cores and patching break downs; but very little patch work was seen. Four men were employed in hand ramming and the rest in taking the molds away and placing the flasks on the machine. It was one of the best regulated molding jobs seen, producing so much work.

At the new Sturtevant foundry in Hyde Park, Mass., a novel feature of conveying the stock to the charging room was seen. The stock bins containing coke, iron, etc., are located in one side of the foundry in line with the cupola. The iron and coke is loaded by hand, passed over a scale, weighed, and run onto an elevator up to the charging floor. Nothing is stored on the charging floor other than a fan blower used in connection with the cupola. Two men are stationed there who drag the car from the elevator, which is located in close proximity to the cupola, unload the same, and give the car a push, which is mounted on a rail track. The car passes down an incline, thereby gaining momentum and passes along over the top of the stock bins onto an elevator wholly by gravity. When this car passes onto the elevator and reaches the back side of same, it comes in contact with a switch, which sets the elevator in motion. The elevator lowers on a level with the ground floor and a man stands there and drags the car from the elevator and pushes it along to the bin where the same is to be refilled. It is certainly an interesting arrangement.

A paper was also read by S. B. Patterson, of the Empire Steel & Iron Co., Catasauqua, Pa., on "Quality of Pig Iron for Foundry Use, as Shown by Fracture and Analysis." It is given elsewhere in this issue.

The net earnings of the United States Steel Corporation for March were $9,912,000, which is $412,000 above the estimate made by the directors. Earnings for April have not yet been ascertained, but it is believed that they will be more than $12,000,000.

The creditors of the M. Zier Boiler Co., at New Albany, Ind., have filed their written consent for the receiver to sell the boiler works in New Albany at private sale, provided that the price must not be less than $11,000. The sale has been long delayed on account of disagreement among the creditors.

The bimonthly settlement of the wages of puddlers and finishers was made at Youngstown last week. No change in wages was made and the puddling rate will remain at $6.12½, which is based on 1.70c as the price of bar iron.

The new open-hearth furnace of the Vulcan Crucible Co., Aliquippa, Pa., was fired for the first time May 15. The plant has been in course of construction for the past six months by the Scaife works, of Pittsburg.

The Weaver Hersh Foundry Co., Allentown, Pa., has made an assignment. The failure is said to have been due to extensive damage resulting from last year's floods, and also to the high price of coal.

A NEW REAMER.

Reamers are familiar enough and of varied size and form, both straight and spiral blades. The spiral reamer is commonly made left-handed so that there will not be the tendency to draw in the tool and get the reamer off the guiding center, a condition of affairs which would have serious consequences in machine reaming. An inventor has taken out a patent recently which will be somewhat of a novelty to many beside the Patent Office authorities, although on the face the scheme looks more like a mistake than a premeditated freak. In either case the invention does not at first glance impress one as the product of a careful designer having a wide acquaintance with machine tool practice. But results are of first importance and the tool is doing better than it looks.

FIG. 1.—A PATENT REAMER.

The halftone in Fig. 1 illustrates a reamer made according to the requirements of the patent granted to John Shaw, of Franklin, Pa. In practice this tool has certainly done good service and is, we understand, adopted freely for the exacting work of the Franklin branch of the Chicago Pneumatic Tool Co. The peculiarity of the tool is in the location and direction of the cutting blades with respect to the axis of the reamer and to each other. The blades of the reamer are so disposed as to each present a different angle to the surface of the metal being bored.

Fig. 2 is an elevation of the cutting portion of the reamer and Fig. 3 is a projection in plan of the face of the reamer, showing the angle of the cutting blades. The blades extend at different angles from each other and from the axial line of the tool. Moreover, the blades are alternately inclined in opposite directions to the axis so that a cutter which is inclined across the axis in one direction is followed in the cutting operation by a cutter which is inclined across the axis in the opposite direction. This gives an excellent shearing cut and some of the holes so finished have very fine surfaces.

The inventor indicates that he has developed the arrangement from considering the tendency of parallel blades to drop into grooves, the following blade to imitate its predecessor whether the cut be straight or spiral. Mr. Shaw says also: "Each blade goes around a portion of the circumference of the hole a distance equal to the angle from the axial line, which ensures a perfectly round hole. This point is very important and is apt to be overlooked."

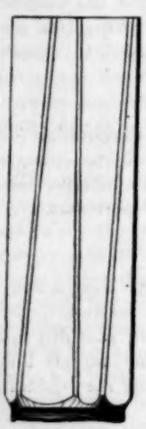


FIG. 2.—SIDE ELEVATION OF REAMER.

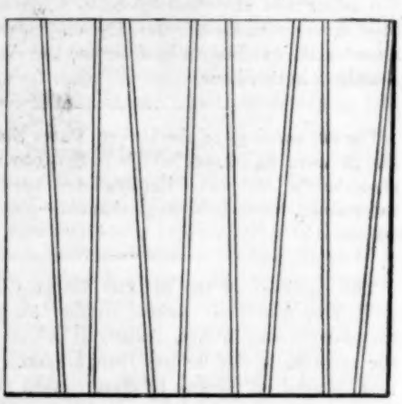


FIG. 3.—PROJECTION OF THE CUTTING SURFACE.

The Tabor Mfg. Co., manufacturer of the Tabor molding machines, has arranged with the Draper Machine Co., of Hopedale, Mass., to manufacture and sell the hand-rammed molding machines which the latter has been building for its own use. The Draper Co. has had long experience in machine molding and at present has in operation in its plant several hundred of its own machines. These are light and mounted on wheels.

THE SCHWAB INDUSTRIAL SCHOOL.

The C. M. Schwab Free Industrial School, established at Homestead, Pa., by the president of the United States Steel Corporation, and to be maintained by him, was dedicated May 16 under most auspicious conditions. Preceding the ceremonies at the school there was a parade of 20,000 persons composed of the uniformed troop of Homestead, which acted as escort to Mr. Schwab, the boys' brigade, of Pennsylvania, thousands of school children, iron and steel workers from Homestead, Braddock, and Duquesne; secret organizations, fire companies, and other societies. At the dedicatory services, Mr. Schwab spoke in part as follows:

"The object of this school is to teach that work to boy and girl is ennobling; that to be able to do nothing is disgraceful. We hope that many young people will here develop the latent taste, and, believe me, no course in life gives me greater pleasure. This country is to be the industrial nation of the world. It is the trained mechanic, chemist and engineer who will be the true leaders in the future of this great industrial country. Hence, persons of exceptional talent and training will be much sought after. And what better locality for such a school than here in Homestead and the Monongahela Valley, surrounded by the greatest industrial works in the world. Let us hope that this will eventually be as great a school as the works which bear the name of Homestead; works which you, the workmen of Homestead, helped to create, for much of the mechanical development of Homestead was due to the suggestions offered by its workmen."

The curriculum of the school has been so arranged that every boy and girl of the borough's public schools may be graduated from the high school familiar with a trade of some kind. The building is 62 feet wide by 98 feet deep. It is three stories high, with a basement and attic. Brownstone, pressed brick, steel and concrete have been used, as its material. All the floors are of concrete, and the building is absolutely fireproof. The engine, large electric light and power plant and the ventilating system, occupy the greater portion of the basement. Electric power is used everywhere. Although more than a dozen forges are in full operation at one time in the blacksmith shop, scarcely a smell of smoke is perceptible, the fires being blown and the smoke and fumes drawn out by means of the ventilating system. This is true, also, in the kitchen, where there is an absence of cooking odors. One of the most interesting departments is the chemical and electrical laboratory on the first floor. Special attention is given to mechanical drawing, wood carving and modeling, while a large room is devoted exclusively to wood turning and pattern making. Adjoining these departments on the second floor is a large lecture room, where instructors meet classes and explain the work they are to do before the students go to their machines. On the third floor are the departments specially set apart for the girls.

The complete building and equipment, including the ground, cost $125,000, and Mr. Schwab has arranged for the permanent maintenance of the institution.

Foreign Steel for a Government Building.

The General Supply & Construction Co., New York, has secured the contract for the furnishing of foreign steel to be used in the construction of the machine shops, etc., of the new navy yard at Charlestown. The material will be of German manufacture, the government officials having decided to utilize European steel owing, it is stated, to better prices and more favorable delivery having been secured in comparison with the offers made by American mills. This will be the first instance of foreign steel being used in the construction of United States Government buildings. The contract calls for about 1,000 tons. Delivery is to be made in four weeks. The General Supply & Construction Co. is now figuring, on behalf of foreign mills, on the contract for the structural material for the large plant about to be constructed in Beverly, Mass., by the United States Shoe Machinery interests. More than 10,000 tons of steel will be employed.

F. R. Phillips & Sons Co., of Philadelphia, will shortly make a large shipment of rolling mill machinery to Scotland.

MOTOR-DRIVEN DISC GRINDER.

The Ransom Manufacturing Co., of Oshkosh, Wis., is steadily increasing its line of direct motor-driven grinders. The company is at present building these machines for 18, 24 and 30-inch emery wheels, but in the near future a 12-inch will be placed on the market.

The illustration shows a recently completed machine which comprises some new features. This is known as the 18-inch motor-driven disc grinder and is of the universal type.

The motor is of the entirely enclosed type, the usual openings at the sides being covered by spun copper hoods, the upper half of these being readily removable in order that the brushes may be adjusted. The armature is wound on a sleeve and this sleeve is pressed on the arbor. The armature shaft is extended beyond the main bearings and carries the discs on the ends. The motor is multipolar and compound wound, manufactured by the Akron Electrical Mfg. Co., of Akron, O.

The end play of the armature shaft is taken up by means of check nuts which are placed on both sides of the bearing on the left hand end. The usual practice has been to locate the check nuts on the inner side of the two bearings, a method which is objectionable on account of the fact that as soon as the armature becomes a little warm the extension crowds these jam nuts against the inside of the boxes and is liable to cause them to cut. Placing the jam nuts on both sides of the one box overcomes this probable cause of trouble. The journals are dust proof and ring oiling.

MOTOR-DRIVEN DISC GRINDER.

The table at the right hand end of the machine is provided with T-slots. These T-slots are found to be as essential on a disc grinder as on a milling machine. The operator can then fasten any template or jig in place and need not bore holes in the table for this purpose. The table is universal to the extent of allowing any angle to be obtained. Other details of the construction are shown in the engraving.

The report of the State geologist of New Jersey gives the production of iron ore from the mines in that State in 1902 as 443,728 long tons against 401,151 tons in 1901, an increase of 10.6 per cent.

The engineering department of the United Coke & Gas Co. has been removed to Second and Cherry Sts., Camden, N. J.

NEW FOUNDLAND IRON AND STEEL BOUNTIES.

A bill has been introduced in the parliament of Newfoundland to provide for bounties on iron and steel manufactured in that colony. The act provides that the governor-in-council may authorize the payment of the following bounties on pig iron, puddled iron bars and steel billets made in Newfoundland:

(1) A bounty of $1.50 per ton on pig iron made in Newfoundland from ore, fuel and flux, the products of Newfoundland. (2) A bounty of $1 per ton on pig iron made in Newfoundland from ore and flux, the products of Newfoundland. (3) A bounty of $1 per ton on puddled iron bars manufactured from pig iron made in Newfoundland from Newfoundland ore. (4) A bounty of $1 per ton on steel billets manufactured in Newfoundland from pig iron (made in Newfoundland from Newfoundland ore) and such other ingredients as are necessary and usual in the manufacture of steel billets, the proportion of such ingredients to be regulated by order of the governor-in-council. Provided that in computing the bounty no payment shall be made with respect to foreign ores or metal produced therefrom used in the products herein mentioned. The bounties will be applicable until June 30, 1910, and shall be payable and gradually reduced, as follows: (a) From the first of July, 1905, to Dec. 30, 1906, both inclusive, the bounties shall be 95 per cent of the amount fixed by section one; (b) from the first day of July, 1906, to June 30, 1907, both inclusive, the bounties shall be 75 per cent of the amount fixed by section one; (c) from the first day of July, 1907, to June 30, 1908, both inclusive, the bounties shall be 55 per cent of the amount fixed by section one; (d) from the first day of July, 1908, to June 30, 1909, both inclusive, the bounties shall be 35 per cent of the amount fixed by section one; (e) from the first day of July, 1909, to June 30, 1910, both inclusive, the bounties shall be 20 per cent of the amount fixed by section one.

The Washington Foundry & Machine Co., Washington, Pa., has purchased the foundry heretofore operated by M. R. Zahniser. President Manning of this company returned a few days ago from New York, where he obtained $30,000 worth of contracts. Among the orders is one for two 20-ton steel castings for the Niles-Bement-Pond Co.

HIGH-SPEED TOOL STEELS.*

BY WILLIAM LODGE.

Approaching the subject of high speed steels, feeds, etc., it may be well to mention the fact that when an agent selling this steel talks to any of our members about it and tells him that two or three times the speed may be used, the prospective customer is likely to get the idea that he is going to double his output by the use of it. Such, however, is not the case for the reason that in machine building the taking off of metal in the rough does not exceed one third of the labor on the entire machine being built; consequently, the saving is largely on this one third. The customer is also apt to get the impression that it is possible to use this high speed and quick feed on all occasions. This also is wrong for the reason that in cast iron the variation in the iron is so great that it is impossible to determine any number of feet per minute. Where the carbon varies from 90 down to possibly 10, it will readily be seen that a much higher speed can be obtained on the low carbon steels than on the high ones; and a good rule to follow is, whenever the speed is so high as to require frequent regrinding of the tool, it is too high. And it will be unreasonable to expect results from the workman if the ironclad rule of so many feet per minute is given to him, because the regrinding and resetting of the tool consumes more time than the lower rate of speed would require.

In using high speed steels on cast iron I find that we are obliged to drop down to a speed of about 45 feet per minute in order to get the best results; and while a good deal of cast iron may be turned at 70 feet per minute, if this feed is given to the workman he becomes confused as soon as he strikes a casting a little bit harder than will admit of this speed. I find in general that the ordinary workman does not reason cause and effect sufficiently well to know that the fault lies in the iron being a little harder, but is rather inclined to fall out with the whole institution as requiring something unreasonable. Forty-five feet per minute on cast iron is double what we have been accustomed to, and all day long the high speed steel will show about the same tendency to become dull that the ordinary tempered steel formerly showed at 20 feet.

In taking light cuts in cast iron we may readily run up to a hundred and even more feet per minute. On the same line of argument, 75 feet for steel in roughing would be more economical than a much higher speed on an entire day's run, because if the extreme high speeds were to be kept up all day, it would require a foreman or superintendent to about every three men, which we all know would not be at all economical. We have found more astonishing results, perhaps, in using this steel for the boring of spindles than in the turning. It will astonish some of our members, I know, when I say that we can bore 50 carbon steel all day long about as follows: Our 24-inch lathe spindle is 44 inches in length. In this we bore a 2⅛-inch hole, and we do this in 58 minutes. In an entire day's run, counting the mounting into the machine and the taking of it out, we average eight spindles on one machine in ten hours. Our 14-inch lathe spindle is 24 inches long, and in this we bore a 1¼-inch hole in 18 minutes. The tail spindle for the 24-inch lathe receives a 1⅛-inch hole its entire length, less two inches, and we can readily bore this hole every nine minutes.

On finishing operations and light cuts and in 30 carbon steel we do run up to 200 feet, and find on this class of work that a high speed and a fine feed are more economical than attempting a lower speed and coarser feed, preparing the work for the grinding machine so as to leave less work on the grinder. I know that this statement is not in accordance with the practice of some other concerns; but after having used the coarse feeds on work that was going to the grinder, covering a period of six months and tested out carefully, and comparing the results with those secured with a higher speed and a finer feed, we find the latter to be preferable. Moreover we can get closer to the exact diameter required, leaving less work for the grinding machine than when we used very coarse feeds.

I believe I am quite safe in saying that if Novo cutters for the milling machines could be had we could lessen the time of doing the work at least one-half on nearly all of our milling. I do not think this would hold good on gear cutting, because wherever a heavy stream of lubricant can be thrown on the cutter the ordinary tempered cutter can be made to work very rapidly.

We have been making some experiments on our drill presses with the high speed steels and find that the most astonishing results may be had by taking flat drills in Novo steel and on account of the high speed possible do much more rapid drilling. The flat drill will do its work nearly as well as the twist drill if care is taken to have the cutting points ground with the same nicety that we would grind the cutting points on a twist drill, and, except in cases where blow holes are met with, we believe we are going to find great advantages in using this steel either as flat drills or straight grooved drills made from round stock. On planing work there is no difficulty at all in having tools stand for roughing operations up to 55 feet per minute, and even more than this on light cuts for finishing. In the matter of finishing cuts it depends a good deal on the piece as to the advisability of using a higher or lower speed; but we get very good results at highest speeds on finishing cuts, and the same thing holds good on lathe work.

We have recently been trying some rather interesting experiments on heavy tools by brazing flat pieces of high speed steels on to machine steel; and as this steel is so exceedingly costly and particularly for heavy planer tools and heavy lathe tools, it might be wise for our members to look into this feature of economy. I shall be glad to show quite a number of these tools fixed in this manner. Of course, much higher speeds may be used in planing where the cuts are intermittent than where they are continuous or where the piece being planed is short. I also find that it is quite possible to use the Novo as a steel for finishing—for instance, as "V" thread chasing and at rates of speed never dreamed of in our old shop practice. It is our experience, and I judge the experience of nearly all other machine shop owners, that the tendency on the part of the men is to use as fine feeds and as low speeds as the man in charge will permit, and we find that the substitution of the premium system of doing work is of greater value in this particular than close superintendence or increased wages as applied to the regular daily rate.

On all operations, such as Jones & Lamson's screw machine or automatic machines where a heavy stream of lubricant can be discharged on to the tool, it is a little hard to determine just where the limit is, but at the present time we find we can use the entire limit of speeds we have in the machines, and could use even more than that if more power was applied to the machines. On high speed drilling and where flat stock is used for the drilling in order to get good results, we find it necessary to use the Cincinnati grinder for grinding the drills in order to keep the points and the lips absolutely central.

I wish to say in conclusion that high speed steels have made it possible to decrease the cost of machine building from 25 to 33 1-3 percent providing the advantage offered in these steels are available to the managers of our shops. These steels have also shown, in many cases, greater possibilities for tempered steels than we ever had any idea of prior to their advent. Some of us who are not taking advantage of the benefits to be derived are losing opportunities in a way that may cause us to drop behind in the race for supremacy; for the live manufacturer will certainly accomplish much greater things by the intelligent use of the various steels that are being sold.

*Read at a recent meeting of Cincinnati Machine Tool Manufacturers.

Arrangements have been made by the Westinghouse Electric & Mfg. Co. and the Westinghouse Air Brake Co., for the establishment at Hamilton, Ont., of a Canadian Westinghouse Co., with a capital of $2,500,000. The control of the company will be held by the two Pittsburg companies, and the remainder of the stock will be owned by prominent business men of Canada. The tariff in Canada has proved an obstacle to American manufacturers, and it is to overcome this obstacle that the new plant is to be established.

In a plant recently installed in the South by the Pneumatic Engineering Co., 128 Broadway, New York, the air lift system pumps 9,000,000 gallons of water per day from four 10-inch wells.

SUGGESTED AT THE SHOPS.

BY F. O. REMAN.

The fear that another fellow will get your job is responsible for many things. Few men like to admit the condition but there is more fact than theory about it. Now and again the truth will out and the results are easily recognized. The man at the lathe usually minds his business by ignoring the next man. Telling how the old hand has struggled to success is so much time taken from your own job. Let the new man find it out for himself. "Nobody showed me anything." Of course it would help him a lot, but he might not appreciate the advice, might resent the aid, and it is a bother, anyway. The new man may get along all right and it will show what he can do. I would like to bring these fellows together and have a general discussion of jobs. Perhaps the fellows could not tell why one man will get out certain work in less time than another man, why some are more adaptable than others and so on. The full meaning of the situation is only understood when men take work on contract and must then get together and swap ideas. The same thing happens in the premium plan where the one job is handled by two men, night and day gangs. The slow man is sure to be benefited by a little plain speaking and he gets it then.

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The men after long contact are wary and hesitate about giving advice. So easy to blunder into a strained condition. Besides, "What's the odds?" The foreman acts as a clearing house of ideas. He is the connecting link and he brings new methods to the different men. This feeling with respect to the other fellow will be recognized as a common shop symptom, but this is by no means the range of its influence. Every man has more or less of it and declines to delegate his job to any one. This is human nature and this side the millennium is not likely to be changed.

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A shop proprietor of rare astuteness has decided that every man holding a position of responsibility must have an understudy—some one who can carry on the routine of the job in case of the principal's absence. This arrangement enables the one to originate and institute better methods while the other preserves the working conditions already established. Either is helpful to the other and both are requisite in carrying out the plan. The one may be absent but there is not then a helpless void. Things are kept moving and the system stands sturdily on its foundations. There is nothing unreasonable about such an arrangement. It is nothing more than the extra reamer or drill, another length of belting or a can of oil.

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A man who has slowly and persistently worked his way up the ladder of promotion in that shop told me his story: "One day the proprietor came around and suggested that I get some bright young fellow as assistant. I worked my way up from the bench and I know my own failings. Good jobs are not so plentiful that I must start in to show the boys how to fill my shoes. I didn't warm up to the idea.

"A couple of months later the old gentleman was round again and said: 'I see you have not got your assistant yet.' Of course I told him of the difficulty of striking the right man, etc., and he looked convinced but weary. Before he went he left me a parting shot: 'Better get one soon or maybe there will not be a place for him to fill.' I got the assistant pretty quick. I consider I can see as far as most people at a really critical time."

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The higher up you get in the management scale, the worse the condition. I know many a shop where there is a total lack of system outside the receipt and transmission of an order for goods. Sometimes there's very little of a system in that direction; but just now I am not concerned with that condition. Suppose you have something to bring to the attention of a responsible man—a new tool, a new process or anything of that ilk. Did you ever notice how few are the responsible men who can give a decision or even have authority to hear and transmit your tale? Everything must filter down from the highest point, and I have sat on the chair many hours waiting the pleasure of men whose courteous ability was never harnessed to an effective means of saving the time of visitors. Men leave their offices with no record of their intentions, route or destination, and subordinates are hopelessly in the dark. A traveling man of wide experience says that the statement of a clerk, "He has just stepped out, but I expect him back in a few minutes," is only properly understood when the visitor at once abandons all expectation of seeing the gentleman sought. The statement is a confession of ignorance and is altogether too common.

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The telephone connecting every department, an office exchange in charge of a capable operator, will often serve to bring the visitor in contact with his quarry. This is not so good as it might be, but will serve in lieu of a better plan. I know of one plan where each department has a phone and every man with a position of any authority is supplied with a board giving a list of the departments. A loose peg fits a hole in line with each name on the list and when the man leaves his post he pegs his objective point. Should he go to another department subsequently he is expected to keep his assistants in touch with his movements and they peg his location. The system saves time and thus lengthens the business life.

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I have just said a word about the capable telephone operator. I suppose that the fact that the talk must be loud enough to be heard over the room has much to do with the use of the instrument. Most clerks are careful in speech because they are heard at both ends of the line. But there is room for improvement. The frequent use of the 'phone in business makes more of an impression than is generally supposed. The instrument is not only a means of communication but the method of operation makes or mars the reputation of the owner. Not all users of telephones are cursed by the boy who answered a call for his chief with the edict: "He can't talk to you now; he's speaking to a gentleman."

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Perhaps if the man of affairs could shake the damnable iteration of routine and unload his burden on to another fellow the ship would not sink anyway. Might give him a convenient chance to divide up the rest of the load and the machine would work the more evenly. There are offices where the repetition of dictated correspondence is considered unpardonable. The bulk of business letters travel along grooves and a half dozen forms will serve as excellent models if the strain of writing a few ordinary replies has been concentrated on their individual preparation. One office man, at least, has a book of numbered paragraphs referring to the business. These cover terms and quotations generally with such data as have been shown to be in demand by correspondents. The stenographers have copies of this guide book and the original letter of inquiry has the paragraphs punctuated with figures so that the correspondent gets a reply that overlooks nothing and presents the case in well-studied forms. Nothing slipshod about this scheme. Simply an application to the office of these mechanical systems developed in the making of machines in a modern shop.

Care of Pneumatic Hammers.

The following extract is taken from a circular recently published by the Chicago Pneumatic Tool Co., of Chicago: "As the air taken into the compressor generally contains some particles of grit and dust it is almost impossible to prevent this foreign matter from entering into the working parts of the hammer, causing the ports to become clogged and rendering it inoperative. The use of a poor grade or heavy bodied oil will also cause the same trouble. A good plan to follow in such cases is to clean by using benzine freely through the throttle handle. This dislodges all foreign matter and cuts the thick oil which can then be removed by blowing the air through the hammer. It is an excellent plan to submerge the hammer occasionally over night in a bath of kerosene and then blow out under pressure the following morning, and lubricate with a good quality of light machine oil. Where the air is unusually laden wtih foreign matter we would recommend the use of strainers or filters to be attached to the tool or placed in the supply pipe as the case may be."

PROGRESS OF STEEL ROADS.

[Gen. Roy Stone in Engineering Record.]

The steel road laid in Murray St., New York, in December last, has come through the winter apparently without varying a hair's breadth either in line or level, and has given general satisfaction in all sorts of weather. This is contrary to the expectations of many people and even of its projectors, who were afraid that horses would slip upon it at times, the grade being considerable. No complaint, however, has been made in this regard and the expected ease of traction has been thoroughly demonstrated in practice. Although no complaint of slipping has been heard, in rolling the steel hereafter slight indentations will be made which will prevent the slipping of horses' feet or of the rubber tires of driving wheels without roughening the tread for wagon wheels.

When the test was made, of hauling a load by a rope with a spring balance interposed, no account was taken of the grade, and as the comparative traction shown was 100 pounds on the rails and 160 pounds on the stone pavement, the advantage was stated at 60 percent. The grade, however, being 2 percent, the actual lift in both cases was equal to 2 percent of the total load, and as the wagon weighed 3,700 pounds, the lift was 74 pounds; this deducted from the amounts named, 100 and 160, leaves the comparative traction due to rolling and axle friction, that is the comparative pull on a level, in proportion of 26 to 86. This corresponds closely with the German tests which are reported as varying from 1 to 3 up to 1 to 5, for the comparative traction on steel and other roads. Reduced traction evidently reduces in like proportion the wear and tear on road, vehicle and power, whether animal or mechanical. The durability of the roads may be assumed from this fact, together with some corroborating data from actual experience, which indicate a life of 30 or 40 years or more. The Murray Street experiment has been carefully watched by the city engineers and many others. The engineers of the Dock Department have reported in favor of the adoption of the rails on portions of the docks where the traffic is especially heavy and is too severe for planking or asphalt. The president of the Borough of Manhattan has called for the specifications preparatory to inviting bids for various lines in the city. The state engineer of New York desires to lay a steel road from the Ulster slate quarries to the Hudson River. The U. S. Government through its Road Bureau at Washington is asking for steel for a road in the District of Columbia. Commissioner Budd, of New Jersey, favors a steel road across the Hackensack Meadows, and a special inquiry comes from the Public Works of London City.

Automobile Roads. It is estimated that the number of automobiles in the United States at the end of this year will be 50,000, and there is strong disposition to move for special roads, in certain localities, in order that these vehicles may have freedom to develop their highest usefulness without danger or annoyance to the general public. Such roads could be made with one or two tracks of the steel plates, and the intermediate and outside spaces covered with grass. Such a road will be free from dust and mud and would be safe from wash by rains, and as the rubber tires would have no effect upon the rail, there would be practically no wear of the road. Travel on such a road would be like driving over a fine lawn, except that the power required would be much less. This saving again, would increase the radius of vehicles with a given amount of fuel or stored power. For such roads there are many routes available about New York, to the eastward along the backbone of Long Island, northwest and southwest across the meadows of New Jersey, northeast into the Connecticut hills, and north under the shadow of the Palisades. Such roads would relieve the congestion of travel and add new and beautiful regions for the development of suburban homes. Motor vehicles requiring only a low headroom, their special roads could easily run under the public roads at crossings.

Highways. It will not be necessary to use as heavy plates as those on Murray Street for country highways, nor to make them so wide, and in general a single track will be sufficient, with perhaps occasional turnouts of macadam, though as a rule the grass will grow close up to the plates and the turf will be firm enough to turn out upon. At each joint of the rail there might easily be a projection which would replace a vehicle on the track, though as a rule the tracks would be laid a little lower than the surface alongside and there would be no difficulty in returning upon the rail at any point.

Loss from Bad Roads. Among its multitudinous activities, some years ago the government at Washington, at the solicitation of the writer, required its 10,000 crop correspondents to report on the cost of hauling and the average distances of wagon transportation for farm products and supplies. These reports, carefully tabulated and averaged, with the census returns, from which were computed the total weight of farm products, with proper allowance for home consumption, altogether established the fact that a total of $900,000,000 is expended annually in such hauling; and the average rate per ton per mile, 25 cents, was found to be 3 times as great as that in Europe or on good roads in America, thus making the net loss by bad roads in this country $600,000,000 annually.

Advantages of Steel. The successful adoption of steel for road construction would not only reduce the expense of hauling far below the European standard, but it would open its own way to provide the means for construction throughout the country. In the first place it would practically eliminate the question of repairs for at least a generation, whereas in stone roads the cost of maintenance is most serious, amounting in some cases to 10 or even 15 percent of the original cost of the road. In the second place, while in the case of stone roads there is nothing that can be pledged as security for a loan, steel rails and their attachments will afford an available security, since they can be removed and laid elsewhere. This additional security added to the credit of a county, which credit will itself be greatly enhanced by the improvement of its highways, should entitle the county to the guaranty of the state, and by this means the county road improvement bonds can be made sufficiently secure to be accepted by the general government as security for national bank circulation or for the investment of postal savings.

Supposing the track metal to cost $2,000 per mile, which would be a fair price in average times, and that the additional expense of laying is paid by local taxation or contribution, the bond issue would only then be $2,000 per mile and the interest only $40 per mile yearly, which is no more than the present cost of keeping a much traveled earth road in repair. Comparing this simple method of providing means with the arduous one of procuring direct appropriations year by year from state and national governments or the still more difficult and oppressive method of local taxation, the securing of good roads for the whole country becomes an easy task.

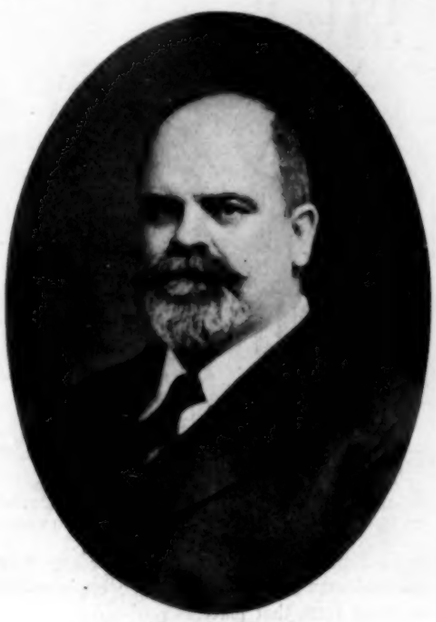
Our contributor, R. A. Lachmann, of 4818 Calumet avenue, Chicago, has prepared a chart of which we have a blueprint copy. This contains a table for compound indexing—using two rows of holes—for all divisions up to 357. The table has been calculated from the circles on index plates furnished with the Cincinnati Milling Machine Co.'s dividing head. The chart also contains other tables which will be found equally useful around the tool room.

The Trenton Malleable Iron Co., Trenton, N. J., reports that business is very good, and although the company has had difficulty in obtaining materials during the past winter those matters seem to be in good shape at the present time. The only apprehension is caused by the demands made by labor for advances, but the company expects to adjust this difficulty within a short time.

The Brown Corliss Engine Co., of Corliss, Wis., is looking for a number of good agencies to handle its work in different parts of the country.

DEATH OF W. R. WARNER.

William Russell Warner died at his home in Covington, Ky., Tuesday, May 12. The 12th of June would have been his 48th birthday. He was born in Covington and was brought up there except for a residence of a few years while a boy in Ashland, Ky. He has always been identified with the iron business, as he started as a boy in the old commission house of William Means in Cincinnati. Going to the Shelby Iron Co., Shelby, Ala., he was for ten years the assistant superintendent under the late Jefferson Christian, who was rated the most expert maker of charcoal iron in the country. Later he was the superintendent of the Alice furnaces of the Tennessee company in Birmingham. From Alabama he returned to the North, spending a short time in the Hocking Valley field as furnace manager. From there he came to Cincinnati, associating himself with the Dayton Coal & Iron Co. and afterwards with Rogers, Brown & Co. He left their service in 1893 and for the past ten years has been with Matthew Addy & Co. He was personally known to practically every foundryman throughout the Middle West. Mr. Warner was a man of large frame, which was an index to his large and kindly heart. He had a smile and a good word for every one. His customers looked upon him as a personal friend. He was a man of unswerving integrity and



W. R. WARNER.

it was a matter of note that he did not have even the small vices, having never tasted liquor in his life, and abstaining from tobacco. He was a life-long member of the Protestant Episcopal Church and for many years had served as vestryman at St. John's, Covington. He had unusual physical strength. In his younger days at the furnaces he had been known to lift 900 pounds. He had a constitution which seemed to promise him the full limit of life. He was in his last illness in bed less than ten days, being attacked by an acute form of Bright's disease. The poison attacked his system with surprising rapidity and his death came before any one except the immediate members of his family suspected that he was even dangerously ill. He leaves a wife and two sons. His loss will be lamented by a large number of friends.

The Damascus Brake Beam Co., East St. Louis, Ill., has purchased a site and will locate a plant in Youngstown, Ohio. Two representatives of the company were in Youngstown a few days ago and stated that the company will build a plant and has already arranged for the erection of one building 200 x 60 feet.

The Clinton Iron & Steel Co. removed its New York offices on May 18 from 71 Broadway to the Blair building, 24 Broad St.

EASTERN PENNSYLVANIA.

HARRISBURG, PA., May 19.—The situation in this part of the state is more encouraging than for some time and there is more activity in business. Inquiry is good and it is said that contracts of considerable size for railroad work are as yet unplaced.

Almost all the available furnaces in the Susquehanna, Schuylkill and Lehigh Valleys are in operation now. In the Susquehanna Valley the number of idle furnaces is smaller than for a long time. Sheridan furnaces and two about Lebanon are the only ones. In the Lehigh Valley the Thomas Iron Co. will start another of its furnaces.

Fewer iron and steel and metal-working companies than a year ago are being incorporated by the State department at present. In over 100 certificates issued since May 1 only three have been to iron companies and only four have been to machine companies. The bulk of the capital appears to be going into smaller and more general enterprises.

The M. H. Treadwell Co., of Lebanon, is adding electrical equipment to its works. Considerable increase of orders for its specialties is reported.

The Weaver-Hirsh Co., engineers, founders and machinists of Allentown, have made an assignment, the cause of the trouble being the diversion of too much capital to permanent improvements in the recent extension of the plant.

The Fleetwood Foundry & Machine Works recently incorporated will make some extensive improvements.

The York Manufacturing Co. recently gave its boilermakers an unsolicited advance in pay.

The Central Iron & Steel Co., of this city, has completed its half year and the product was slightly behind that of the previous six months. Some heavy rolling was done last week. The Pennsylvania Steel Co. has also been making a good output in all lines. The rail mill broke its record for 24 hours, over 1,200 tons being rolled.

The Central Iron & Steel Co. will start its open-hearth steel plant in the fall.

The Lehigh Steel & Iron Co. will start another furnace at Allentown. Repairs are now being completed.

The Reading Foundry Co. has been awarded the contract for the pipes for Reading's water main extension. There was keen competition, the United States Cast Iron Pipe & Foundry Co. being a close bidder.

Vesta furnace of the Susquehanna Iron & Steel Co. was banked several days ago to allow repairs to be made.

The Valley Iron Works near Coatesville are being rehabilitated and will be started up this spring.

The Chester department of the National Tube Co. is to be started on full time. Orders for skelp have been placed.

The Reading Iron Co. has moved its foundry department into a new building which has been under construction for some time.

Acquired by the Semet-Solvay Co.

The Retort Coke Oven Co., of Cleveland, has sold its business, patents and other assets to the Semet-Solvay Co., of Syracuse, N. Y., the transfer becoming effective on May 14. The entire organization of the Cleveland company is taken over by the purchasers. The Retort Coke Oven Co. is building a block of ovens at the blast furnace of the Cleveland Furnace Co., now nearing completion, and the furnace and coke plant are expected to be in operation in July. The officers of the Retort Coke Oven Co. are the following: S. T. Wellman, president; J. W. Seaver, 1st vice president; C. H. Wellman, 2d vice president; T. R. Morgan, secretary; A. D. Hatfield, treasurer; John F. Wilcox, general manager and chief engineer.

At the conclusion of the convention of the National Stove Manufacturers' Association, in Cleveland last Thursday, it was decided to hold the next convention in New York. For the first time in thirty-two years there was no report of deaths in the ranks of the association. The following officers were elected: President, Henry Cribben, Chicago; vice presidents, Peter B. Acker, New York, and J. W. Van Cleve, St. Louis; treasurer, Lewis Moore, Joliet, Ill.; general secretary, Thomas F. Hogan, Chicago.

A VARIABLE SPEED GOVERNOR.

The Iron Trade Review recently published an account of a speed changing device applied to a Brown Corliss engine. Another method of varying the speed of an engine has been patented by Leslie J. Watson, of Port Huron, Mich. The governor is illustrated by the halftone, Fig. 1, and Fig. 2

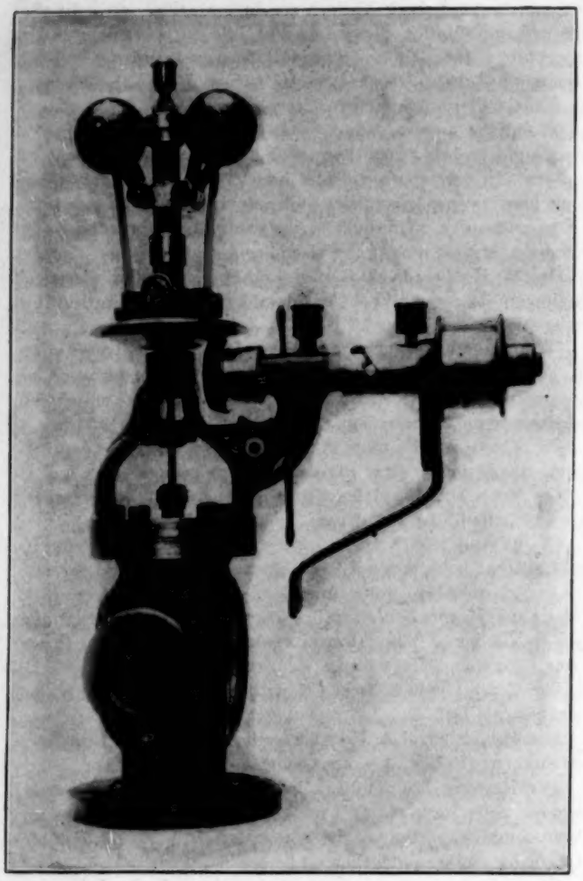


FIG. 1.—GOVERNOR WITH VARIABLE SPEED ATTACHMENT.

and 3 show a front elevation, partly in section, and a detail view respectively. The support for the governor is seen at A bolted to the flange of the valve chamber. The balls of an ordinary centrifugal governor are indicated by B and these may be connected in any desirable manner to the valve stem C. A friction disc E is attached to the lower sleeve of the governor and the stem C passes through the pinion and sleeve and terminates at its upper end in a head or abutment D which normally rests in the seat of the upper sleeve of the governor.

The means employed for increasing or diminishing the speed of the governor consist in providing a beveled pinion or friction disc F which rolls against the disc E, already mentioned, and the governor speed is affected temporarily according to the point of contact with the discs. The speed of the engine being altered correspondingly brings the motion of the governor balls back to their normal rate.

The disc F is carried by the shaft G, which is in turn connected by means of a belt, running on the pulley H, with the crank shaft of the engine. The necessary adjustment of the disc F to and from the center of the disc E is secured by a sleeve I having the interior formed with a spiral thread and an operating lever fastened to the sleeve by a setscrew. At the inner end of the sleeve I and in back of the disc F is an oil shield which protects the discs from the waste oil escaping at the ends of the sleeve.

A hand wheel M has a threaded stem which passes through one of the legs of the governor support A. This part of the device is also shown, in plan and section, at Fig. 3. On the end of the stem is a spring N guided by a loosely fitting rod having an arrow head at one end forming an abutment for the spring. The arrow head is seated in a recess in an arm secured to a rod O pivoted in the legs of the governor. In the center of this rod a second arm is rigidly fastened in a horizontal position so that the free end will engage a grooved collar on the valve stem C.

When it is desirable to change the speed of the engine, the lever J is moved to the right or the left, turning the threaded sleeve in its bearing and carrying the friction pinion F to or from the center of the disc E. When the parts are adjusted the sleeve I may be tightened in place by means of the setscrew. The screw threaded stem of the hand wheel M is turned to the right or left in order to maintain a suitable pressure between the discs E and F and hence a positive drive. The hand wheel M moves the stem C up and down through the medium of the pivoted rod and the arms and by reason of the head D of the valve stem coming in contact with the seat the disc E will be forced into engagement with the disc F in its adjusted position. The spring N allows a slight but sufficient play for the valve stem when moved automatically by the governor. The lever J is in practice connected to

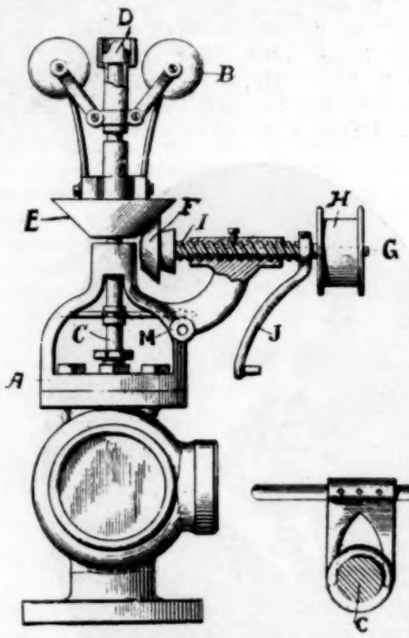


FIG. 2.—ELEVATION PARTLY IN SECTION.

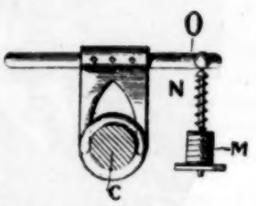


FIG. 3.—FRICTIONAL ADJUSTMENT.

a reach rod extending to the foot board or any other convenient place of manipulation, giving the engineer full control of the speed from that place.

The inventor says in regard to the frictions that "the frictional contact of the cones is more reliable than the same on the belt. The drive cone consists of paper, compressed by a screw faced flange acting against a stationary back flange."

Some change of ownership in the Tuscora Steel Co. has taken place, by which M. F. Straus, of Philadelphia, and J. R. Jackson, of New York, already interested in the Marietta Sheet & Tin Plate Co., become president and vice president of the Tuscora Steel Co., and Lakin C. Taylor, of Cambridge, O., secretary and treasurer. The Marietta Sheet & Tin Plate Co. is backed by the American Tin & Terne Plate Co., of Philadelphia, and the tinhouse equipment is now being removed from Philadelphia to Marietta. The Tuscora sheet mill is leased to the Sheet Steel Co., of Pittsburg, in which George McLean and other stockholders of the Allegheny Steel & Iron Co. are interested. The first year of the lease does not expire until next October.

The first annual meeting of the Century Stove & Mfg. Co., Johnstown, Pa., was held a few days ago, when the old officers were re-elected. The company started fourteen months ago and has been prosperous. The directors were authorized to sell treasury stock and make improvements and additions.

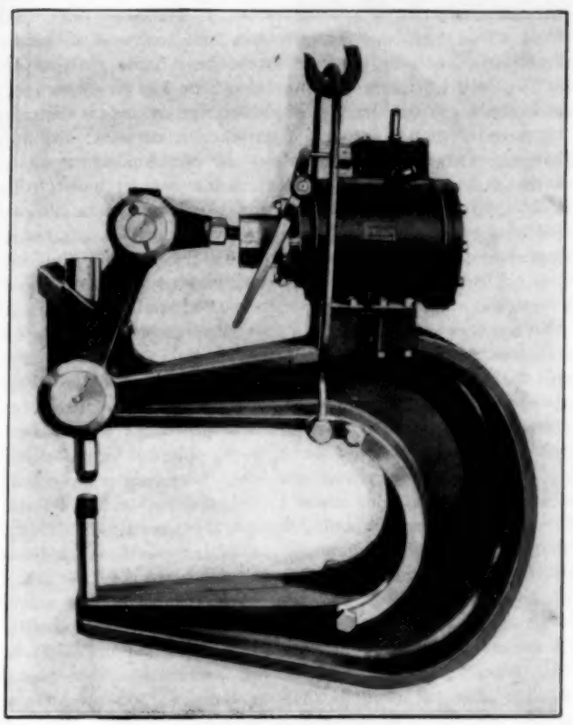
The Washington Machinery & Supply Co., Spokane, Wash., has purchased the Ulley-Smith machine shop and will move the plant to the location of the former company.

NEW COMPRESSION RIVETER

The compression riveter recently designed by the Chicago Pneumatic Tool Co., of Chicago, is made in two sizes: No. 1, weighing 1,900 pounds, and No. 2, with a weight of 2,275 pounds. The first has a 30-inch reach, 16-inch gap and has a capacity up to ¾-inch rivets; the larger machine has a 36-inch reach, 20-inch gap and has a capacity up to 1-inch rivets.

The machine has been designed more particularly for structural work and has already received a thorough trial. The principal parts comprised in the construction of the machine are a cylinder, toggle joint, plunger and frame. The piston rod connects two levers of different length forming the toggle joint, the lower ends of the larger levers are fitted to trunnion bearings on the main frame and the end of the short lever is fitted to a bearing block in the plunger. The die holder is screwed into the lower end of the plunger so that any desired change in the distance between the dies may be readily effected.

The plunger has a 3½-inch stroke and acts in a direct line



A NEW COMPRESSION RIVETER.

with the axis of the rivet. The machine is balanced in any position and hangs by a bail, enabling the operator to turn it in any direction with but little effort.

An officer of the Alabama Steel & Wire Co. announces that the company will be making iron at one of its new furnaces at Gadsden, Ala., by the last of July or the first of August, and that steel making will follow about five months later. The rumor that the steel rod, wire and nail mill belonging to the company and now located at Ensley will be removed to Gadsden is authoritatively denied.

The Uniform Steel Co., Rahway, N. J., informs us that instead of shutting down its plant, as reported in Eastern newspapers, the company has been running it night and day without stopping an hour.

The Etna charcoal furnace of the Etna Mfg. Co., Etna, Ga., has been leased to T. T. Lewis and associates, St. Louis capitalists, for a period of ten years, with an option to purchase. The rental is said to be $50,000 and the purchase price $500,000. The plant was built in 1870, rebuilt in 1889 and has been idle for several years, but recently has been much improved by the owners, D. B. Hamilton and three sons. The product is car-wheel pig iron, and the annual capacity is 10,000 gross tons.

NEW BOOK ON MACHINE SHOP TOOLS.

MODERN MACHINE SHOP TOOLS; Their Construction, Operation and Manipulation. By W. H. Vandervoort. M. E. Cloth bound, price $4. Published by N. W. Henley & Co., New York.

This is a weighty treatise of 555, 5¾x6-inch, pages written by a man evidently in close touch with shop precedent and custom. The book is the outgrowth of a series of papers prepared for the students in machine shop practice at the University of Illinois, but the arrangement and treatment show little of what is usually associated with the productions of the professor as prepared for his college classes. From first to last the author has discussed the tools of the shop in a simple style, easily within the range of understanding of any first year apprentice with a grammar school training. The introduction is practically addressed to such young mechanics and admonishes the tyro of the need of obedience to the foreman, of good judgment and of other things. A great part of the book is therefore of an elementary character, the hammer, chisel and file receiving minute attention along with the more complicated equipment of the shop. It should not be understood, however, that the information so given is trite and unprofitable. The mass of data is cleverly arranged and in the case of the file for example the topic is exhaustively treated.

The distinction between the hand and machine cut, the reason for using single or double cut and the attachment of handles, with many other points of interest, are elucidated at length. A recent suggestion that the file might be improved by discarding the tapered tang and making this part with parallel sides to fit the straight hole drilled in the handle has been ignored. The author has evidently found his task a sufficient burden without leaving the sure ground of workshop custom. This is the field in which he is decidedly at home and his treatment is strong. The essential elements in a calipered fit are set forth by one who can undoubtedly feel the distinction between contact and pressure. The cultivation of this judgment is among the rudimentary training of the craftsman and the emphasis is useful to the young student of the shop. A number of handy tables, methods of splicing rope, aligning shafts with the transit, jig and fixture work, economical use of machine tools, etc., are handled in workmanlike style. The 673 illustrations are of unequal merit. There are many excellent wax engravings, a few zinc etchings which are plainly outclassed and a number of halftones, etc. Many of the latter have had service elsewhere and have not improved with age. The errancy of the types is shown in "Glason" and "Trautwein." The same gang cutter is illustrated in two places, page 313, Fig. 435, and page 342, Fig. 476. Self-hardening steel may be cut to length by nicking with a suitable disc, though we are told that "it must be nicked on the emery wheel and broken to required lengths as it cannot be cut when cold." This latter process has been described in *The Iron Trade Review*. These items are of little consequence in comparison with the store of shop knowledge so systematically presented. It is at once a manual of practice for the apprentice and young journeyman and a book of many valuable suggestions worthy the consideration of men in charge. Not least of its uses is as a reference book.

The consolidation of the three leading industries in South Baltimore, Md., as mentioned in these columns last week, is expected to be followed by important additions to the plants of the new company, which will have about $400,000 available for extensions and for working capital. The present capitalization of the three industries is as follows: Ryan & McDonald Mfg. Co., $125,000; South Baltimore Foundry, $50,000; South Baltimore Car Works, $300,000. The extensions will give employment to about 300 additional skilled mechanics. One of the most important additions will be the manufacture of steel cars at the plant of the South Baltimore Car Works. At the Ryan & McDonald plant the making of steel castings and malleable iron will probably be begun. At the present the plant makes only gray iron castings.

The Douglas Electric Co., Douglas, Wyoming, has purchased two 80-h. p. direct-connected engines from the Ball Engine Co., Erie, Pa.

How to Determine the Quality of Pig Iron.*

BY S. B. PATTERSON.

Iron is one of the most important of the elements that go to make up this earth. Its characteristics are the same at all times and in all places, and there cannot be poor iron any more than there can be poor gold or poor silver. No absolutely pure iron is produced outside of the laboratory, the nearest approach being the wrought iron of commerce. What we will consider today, viz., pig iron, is not iron at all, strictly speaking, but an alloy of which iron is the chief component. It is not a simple mechanical mixture of a few substances, such as brass is, bell metal and German silver, but a complex union of a large number of varying elements. It differs, too, in this respect: the component parts of these simple alloys can be so proportioned as to control the product absolutely, while only partial, intermittent, and variable control can be exercised over the process in the manufacture of pig iron.

The phenomenal advances made in the manufacture of iron during the past forty years have been made possible to a large extent by the great progress made in chemistry. The most important adjunct of the blast furnace today is the laboratory, and the majority of our most progressive and successful furnace superintendents are its graduates. As a type of this class, Mr. James Gayley comes at once to our minds, and it is with pleasure that we add the name of the president of the Empire Steel & Iron Co., Mr. Leonard Peckitt. It is interesting to note that both these gentlemen passed a portion of their apprenticeship with the pioneer anthracite furnaces of America, the Crane Iron Works, at Catasauqua, Pa. One could almost as well operate a blast furnace without a blowing engine, as without a laboratory.

The Danger of a Little Chemistry.

The science of chemistry is only on its threshold. "A little knowledge is," sometimes, "a dangerous thing," and wrong conclusions are often deduced owing to an improper understanding or application of the data at hand. To illustrate: A foundryman learns that silicon in pig iron makes soft castings, and based on the maxim that you cannot have too much of a good thing uses very high silicon irons only to find to his disgust that he has a lot of castings on hand too hard to use. Rules galore instructing us how much of this and that element are required for all shapes, kinds, sizes and conditions of castings, very much on the order of cook book recipes, are constantly making their appearance. They are of no value. The housewife has to do with mechanical mixtures, while we are concerned with intricate chemical combinations. There is no analogy between the pastry cook's art and the iron founder's. We must realize not only the great number of metals and metalloids to be found in our alloy, but that they combine with each other as well as with the iron; that the new compounds thus formed have characteristics differing from those of either component, and that the influence of an element may be increased, lessened, or neutralized in the presence of another. The authors of these formulas specify for each kind of casting the amount there should be of graphite and combined carbon, silicon, manganese and phosphorus between certain limits, with an upper limit to sulphur. But they make the maximum and minimum so far apart (a wise precaution) as to make the rules too broad to be of much, if any, value. If an attempt at exactness is made, they are equally without value, for reasons already explained. Like the tramp who was too light for heavy work and too heavy for light work, the rule will not work in either case. One author considered only the ratio of the graphitic to the combined carbon, accepting iron with almost any silicon percent the furnaceman might send. Then we had a class whose fad was the silicon contents only, and I have known of a few cases where manganese was considered the sole mainstay of good castings.

Carbon and Silicon the Main Stays.

Let us now consider those influences exerted by the ordinary elements to be found in pig iron which are generally accepted as established. I consider that carbon and silicon are the essential constituents of foundry pig iron. The remaining ordinary elements are manganese, sulphur, phosphorus and titanium. At times, and in small quantities, are found a portion or all of the following: Copper, arsenic, calcium, magnesium, vanadium and occasional other rare metals. Carbon in pig iron occurs in two forms, in the graphitic and in the combined state. In the former case it is mechanically mixed. All the other elements of our alloy are chemically combined. Some scientists claim that there are other forms of carbon in iron, but as the matter is still in the cloudy realms of speculation, we will not consider them. Carbon makes pig iron fluid, thus differentiating it from wrought iron. When graphitic, it conduces to soft castings. When combined it makes them hard. The fracture of pig iron is a crude indication of the ratio of the graphitic to the combined carbon. No. 2 X and No. plain iron having nearly all the carbon in the graphitic state; gray forge has less graphite and more combined carbon, and so on down the grades until we reach pure white iron in which the carbon is practically all combined. Therefore, the fracture is a sufficiently close guide in selecting ordinary pig iron as to the relative contents of the two forms of carbon. Silver gray iron has an appearance of its own too familiar to need description and is outside the category of ordinary pig iron when it comes to the appearance of its fracture. To show one of the misconceptions of the past, such iron was called carbonized, or burnt iron, in my youthful days, while we know now that it is a siliconized iron. Now it commands a premium; then it was almost unsalable. The amount of total carbon in pig iron is fairly constant, being generally within the limits of 3¼ percent and 4 percent.

Silicon and carbon, as before stated, give foundry iron its essential characteristics. Were the remaining elements absent these characteristics would still be preserved. The effect of silicon in itself is to make iron hard, and yet it serves admirably to make soft castings. I believe a correct explanation of this seeming paradox to be as follows: On melting pig iron, and on remelting cast iron, there is a marked tendency in the graphitic carbon to go into the combined state, the amount so changing being dependent on certain conditions. This increase of the combined carbon increases the hardness of the casting. Silicon diminishes this tendency of carbon to change its condition, thus keeping the graphite more nearly to its original proportion, and therefore preserving the quality of softness. The scientific statement is that silicon diminishes the solvent power of molten iron for carbon. I presume another way to put it is that combined carbon produces a greater degree of hardness than an equal amount of silicon, and the silicon having the greater affinity for the iron prevents an equivalent amount of carbon going into combination with it. Silicon thus secures softness by preventing the formation of the more efficient hardening agent, combined carbon. Having a sufficiency of silicon to produce a soft casting, any excess causes hardness.

The claim has been made for many years that silicon produces graphitic carbon, i. e., causes carbon on the remelting of iron to pass from the combined to the graphitic condition, and cases have been instanced where good castings have been made from all scrap iron or from very inferior grades of pig by the use of high silicon compounds. But if such be the fact, does it not seem strange that intelligent foundrymen continue buying the higher-priced foundry grades when cheap mottled and white irons would do as well? I am sure there are other iron masters than your humble servant who would like to see openings for these off grades other than the furnace top.

The action of the blast in the cupola oxidizes a small portion of the carbon and of the silicon. Per contra, the iron absorbs carbon from the fuel, sometimes sufficient to more than offset the loss by oxidation. Not so with silicon, which diminishes at every melting.

The Effect of Manganese.

Manganese is a beneficial element in pig iron to a certain limit, serving two functions. It eliminates some sulphur, whether the sulphur is inherent in the iron, or absorbed from

*Read before the New England Foundrymen's Association at Boston, May 13, 1903.

the fuel during melting. It, also, acts as a bulwark to the silicon, diminishing the amount of wastage during melting. The explanation is that manganese, like silicon, oxidizes at the temperature of melting iron, thus dividing the action of the blast in the cupola.

The invention, or more properly the discovery, of the pneumatic process of making steel gave a wonderful impetus to metallurgical chemistry. As an epoch-making event it ranks in the industrial world with the discovery of America by Columbus in history. In the manufacture of iron and steel it led mankind from the dusk of empiricism to the light of scientific knowledge. Let us refer to the Bessemer process for enlightment on our subject. It is known that blowing air through molten iron in the Bessemer converter immediately starts the oxidation of the manganese which is followed very closely by the burning out of the silicon, both elements being soon eliminated. At the end of this first period which lasts from eight to ten minutes, the temperature not having been sufficiently high, no diminution of the total carbon takes place, but there is found to be an almost complete conversion of the carbon from the graphitic to the combined state. Please note that this change takes place immediately after the disappearance of the silicon, which fact seems to me to be proof in a negative form of my previous statement of the function of silicon in maintaining carbon in the graphitic form.

The action of the blast eliminates the manganese and silicon at a temperature slightly above the melting point of iron. Carbon, however, is not oxidized to any appreciable extent at this temperature, requiring a much greater intensity of heat to effect its removal. This necessary degree of heat is produced by the rapid combustion of the silicon and manganese, and the disappearance of the carbon therefore follows as a sequence of their elimination. We do not, however, obtain any such increase of temperature in the cupola, because the air is blown over the molten metal and not through it, as in the converter, and the carbon therefore is not consumed to any marked extent. In the latter case the action is superficial, the oxidation being slight and incidental, while in the other it is fundamental and complete.

I know of a brand of iron wherein the manganese content was so small as to be a negligible quantity; nevertheless, the iron was used successfully for about every species of casting from stove plate and light bench hardware work at one end of the gamut, to water pipe and engine cylinders at the other. The iron was selected in each instance with more silicon than would have been done with irons containing the ordinary percent of manganese. This brand was noted for its low sulphur. Owing to absence of manganese, however, it was the more incumbent on the foundryman than usual to use a low sulphur fuel for melting it.

Manganese, like silicon, when in excess causes hardness. This fact is shown in the alloys spiegeleisen and ferro-manganese, both of which are characterized by extreme hardness. The former contains 10 to 30 percent and the latter often reaches 80 percent manganese.

Phosphorus and Sulphur.

Not much need be said as to phosphorus, as its influence is well understood. It makes iron fluid, so that it flows readily into every intricacy of the mold, taking the most delicate impressions. It, also, reduces shrinkage. As it causes weakness and brittleness the amount must be kept within bounds. For malleable castings, however, but little phosphorus can be permitted, the limit being slightly above that for Bessemer iron.

Sulphur still remains as a bete noir to vex the metallurgical mind. It is the rod of affliction to many a poor iron master. It does not seem to have a redeeming quality. In iron it causes hardness, blow holes, weakness and shrinkage. It generally occurs as as sulphide of iron, but not infrequently forms a compound with titanium, and probably with some of the rarer metals which are occasionally found in iron. I particularly call attention to this fact for the reason that the determination of sulphur is generally made in furnace laboratories by the evolution method, which has a popularity owing to the speed and ease with which it is accomplished. It fails, however, to give that portion of the sulphur which is combined with titanium.

It is probable that titanium sulphide is innocuous in pig iron, but I am not aware that this matter has ever been determined.

While on the subject of sulphur I will refer to a prevailing theory which I believe to be erroneous. I alluded to it when discussing the influence of silicon. It is that silicon in the cupola increases graphitic carbon by driving some of the combined carbon into the graphitic form; and, also, that the grayness of cast iron in the blast furnace depends upon the amount of silicon present.

Deceptive Appearances.

I have made hundreds of tons of iron, the fracture showing a very coarse grain, and a very dark color, sufficiently so to grade it as No. 1 or No. 2X, but in which the silicon contents were less than 1 percent, sometimes even running below .75 percent. More than one foundry customer have eagerly picked out such iron as being just what they wanted, and were astonished when informed that it would make castings so hard that they could not be drilled. This iron was made for puddling at a rolling mill, where very high grade wrought iron was a specialty. Per contra, the same blast furnace with the same materials produced irons gray forge in fracture, but with more than 3 percent silicon, and at times even a decided mottled iron with more than 2 percent silicon. Here we have two instances of the exact reverse of the theory: viz., high graphitic carbon with low silicon and low graphitic carbon with high silicon. Now our analyses showed sulphur down to a mere trace in the low silicon 2X iron, and an amount above normal in the high silicon forge and mottled, so that sulphur would seem to be a factor to be considered.

These low grade irons were not produced intentionally, but the furnace made them in spite of our efforts to the contrary. It always happened in very hot weather, and when the atmosphere was surcharged with moisture, with a light burden on the furnace, which light burden was carried (but in vain) to secure a beter grade of iron. I offer with hesitation the following off-hand explanation of this phenomenon, and as a preliminary to a clear understanding will briefly outline the theory of the blast furnace operation. The action of the gases removes the oxygen of the ore, producing a nearly pure iron, which makes its appearance in a porous or spongy condition just above the zone of fusion. So far we are in the realm of established fact. This iron sponge now absorbs carbon, silicon and other elements going to make pig iron, but as to the exact modus operandi and as to the exact place, and the exact order of these final processes we can only speculate. With such a multitude of variable and changing conditions such as the relative proportions, kinds and qualities of materials, speed of operation, temperature and quantity of air blown, and the condition of the atmosphere, it is highly probable the sequence of the absorption of the various elements and the intensity of the various actions are subject to continual change. The discordant results often obtained from a blast furnace can only be explained on such hypothesis.

It takes somewhere about 200,000 cubic feet of air to make a ton of pig iron. The amount of water carried into a furnace on a hot muggy day must therefore be no inconsiderable quantity. A gentleman who operated a small furnace told me that he had made calculations showing that the weight of water driven in on some such extreme day, was greater than the tonnage of iron made. The decomposition of this water must very materially reduce the temperature of the furnace hearth, which means low graphite and high combined carbon, and also high sulphur. But with the furnace carrying a very light burden the higher zone may be very hot, so that we can imagine the reduction of the silica taking place in such upper hot zone, and the absorption of the silicon by the iron sponge. This sponge now impregnated with carbon and silicon descends into the zone of fusion, the temperature of which and of the hearth beneath is below normal, for the reason just given. In consequence of this comparatively low temperature a lesser portion of the carbon becomes graphitic, and the iron absorbs, or perhaps we may more correctly say retains more sulphur than it would have done with a hotter furnace hearth.

To my mind the ratio between the graphitic and combined carbon is not so much a function of the silicon, as of the temperature of the furnace hearth.

Influence of Titanium.

Titanium, the last named of the ordinary elements of our alloy, is one about whose influence there is much misconception. In my business experience I have had instances and have heard of them where bad castings were attributed to titanium in pig iron. But I do not know of a single authenticated case which showed such claim to have any foundation. The real victim of this element is the furnace manager, not the foundryman.

Titanic acid occurs in almost every iron ore, and it impregnates some magnetites to such an extent as to render them valueless, in the present state of our art. There are many million tons of such ores in the Adirondacks. Most of the titanic acid goes into the furnace slag, and being very difficult of fusion, a sticky cinder results which obstructs the tuyere openings, and being cumulative, gradually builds up the crucible. Our experience with titaniferous ores has been in the past, when blast temperatures were very much lower than now. Then ores were rarely judged by chemical analyses, and consequently titanic acid would only be discovered by its injurious effects on the working of the furnace.

I remember hearing of the experience of one of the old-fashioned furnace founders in the days when those functionaries went about their duties with closed mouths and wise looks, and who were supposed to be the custodians of certain maxims too profound and too valuable to be imparted to their fellowmen. Owing to the closing up of his furnace hearth, recourse was had by the furnace owners to a chemical examination of the materials used, when it was found that one ore contained a large percent of titanic acid. By leaving off this ore the furnace was saved, but always after that our metallurgical Solomon was certain that any bad working of the furnace was due to some more of that "d—— botanic acid.'

It is possible, with our high blast temperatures and consequent hot furnace hearths, that the slag from ores containing a moderate amount of titanic acid could be rendered sufficiently fluid to flow through the cinder notch; but while the supply of ores free from this substance is abundant, no one seems sufficiently interested to try the experiment. But very little titanium goes into the iron, and I have never seen any proof that this little produced an injurious effect. On the contrary I do believe it imparts strength. Prof. Porter W. Shimer states that he has always found some titanium in pig iron, the range of his analysis showing it from .05 to .40 percent.

The Selection of Irons.

Open hearth and Bessemer steel mills can only be operated with the aid of the laboratory, and they necessarily purchase their pig iron on full and explicit chemical specifications. Requisitions of such kind are welcomed by the progressive furnaceman. But there are many foundries not in a position to operate a laboratory. By what simple rules can they be guided in selecting their irons? Most blast furnaces are run on pretty constant and uniform assortments of raw materials, when making any one particular kind of iron, be it foundry, mill, or basic open hearth. Under such uniform conditions the phosphorus is bound to be constant, as all that is in the raw materials goes into the pig iron. The manganese will vary more, as some goes into the iron and some into the slag, but the variation will not be sufficient to affect the castings. Silicon and sulphur are the variable elements, the former to the greater extent. For this reason all furnace companies do, or should, analyze each cast for these elements. Now let the foundryman ascertain the usual percents of phosphorus and manganese to be expected in the iron he purchases. Should these be changed at any time by a change in the raw materials, the furnaceman should inform his customer. The fracture shows the ratio of the graphitic to combined carbon sufficiently near for all practical purposes. Finally, with the silicon and sulphur contents given, the foundryman has all necessary data to make a start. Owing to the endless variety of sizes and shapes of patterns, and the very many qualities sought for in castings, some experimenting will be necessary before obtaining the end desired. By getting his data and working out his conclusions in advance of operations, he will be able more quickly, economically and satisfactorily to reach his goal than by any hit-or-miss method.

I am inclined to think that the smaller foundries often use too many kinds of iron. The disadvantage in so doing is that in the event of the need of checking up the analyses of the pig irons, the time required and expense incurred are thereby increased as well as the difficulty of locating the trouble. It is seldom necessary to go beyond two brands to get a desirable mixture.

The pig iron manufacturer gets no guarantee as to furnace results from the purveyors of his raw materials. He ascertains the analyses of his fuels, of his iron ores and their physical condition and the analyses of his flux. With these data, and with a knowledge of his conditions of manufacture he must deduce the proper mixture for his furnace, and the proper way to run it. So with the foundryman. A conscientious furnaceman will furnish an honest analysis of his pig iron. If he is a wise man he will not assume the ability to advise his customer, how to select, how to mix, and how to melt his iron to get specified results. He should decline such a task, knowing full well that the man who operates the foundry cannot do it successfully on the judgment of another. The foundryman is on the ground, he has all the data, and it is up to him to get the proper results. He must do as the furnaceman does; learn the general laws applying to his materials and processes, make a study of his particular conditions, and then work out his own salvation.

The Furnaceman's Problem.

Permit me, in closing, to make a plea for the furnace manager. He cannot drop his cupola bottom at six p. m. and feel that his tasks and troubles have ceased for a twelve hours at least. He has to run a continuous performance without a drop of the curtain or an intermission from the day he lights until he blows out, or the furnace goes out in spite of him. Don't attribute your defective castings to poor iron without having made a careful investigation, and having ascertained the facts. Remember the pig iron is but one factor in the problem. There are cokes and cokes, and coals and coals, some containing a large percentage of sulphur which is sure to deteriorate your castings. I have known foundrymen who used no flux, and whose product in consequence would acquire additional sulphur from normal and even low sulphur fuels. The manner of charging the cupola, and the position of the tuyeres have their influence. Years ago, to facilitate puddling, a preliminary process called "fining" was in vogue. It consisted in playing a sharp blast of air upon the surface of molten iron with sufficient force to agitate the metal, thus burning out a portion of the carbon and silicon. This preparation made the subsequent puddling operation shorter and easier. I can imagine tuyeres in a cupola so placed as to fine the iron, thus increasing its hardness.

The quality of castings is, also, affected by the condition of the molding sand, the manner of pouring and the form of the patterns. It is probable that defective castings are sometimes caused by the use of too much rusty or burnt scrap iron. Both kinds are iron partially oxidized, which condition is not changed by remelting except that a portion of the iron oxide may be fluxed off by silica furnished by the sand on the pig iron, dirt with the scrap, or the ash of the fuel. The cupola does not materially change the character of the iron melted; its function being merely to render it fluid so that it can be put into specific forms. The blast furnace on the contrary is the instrument used to effect a result by means of numerous and complex chemical actions and reactions. An iron ore is essentially an iron oxide wtih the gangue as an accident; and the function of the furnace is to deoxidize the ore, remove the gangue, impregnate the wrought iron sponge with the silicon and carbon needed to make it cast iron, and to melt the product. It can as readily or more readily deoxidize rusty and burnt scrap, as it can the ores nature furnishes, and make therefrom fully as good pig iron.

Do not understand me as belittling the cares of the foundryman. He has them in plenty. His is an exacting vocation filled with much detail, requiring unremitting care and patience, and one confronted with many difficult problems. Your guild and ours are kindred professions, and we can lighten each other's pathway by frank intercourse, honorable and honest dealings, and a mutual regard and respect.

INDUSTRIAL SUMMARY.

[If you are in need of machinery of any description, please notify *The Iron Trade Review*, and we will put you in communication with our advertisers at once.]

New Buyers in the Market and Some of Their Wants:—

Blacklock foundry, South Pittsburg, Tenn., is in the market for sad-iron finishing machinery, such as grinders, polishers, nickel-plating dynamos and supplies, etc.

Jos. M. Reel, Arapahoe, N. C., will buy 20-horsepower boiler and engine.

Wilson Laundry Machinery Co., Columbia, Pa., will be in market for 100-horsepower boiler and 75-horsepower engine.

Richardson & Morris, Phoebus, Va., want small hoisting engine and boiler.

Cowpens Cotton Oil Co., Cowpens, S. C., wants to buy 12 x 20 automatic engine, 75-horsepower, with 80 to 85-horsepower boiler; new or second-hand, with guarantee; Atlas preferred.

Conrad Rawls Shoe Co., Louisville, Ky., will need 75 to 100-horsepower engine and boiler and dynamo, steam-heating apparatus and sprinkler system.

G. G. Glower, Harry Cantey and James T. Field have incorporated the Glower Co., Atlanta, Ga., with capital of $5,000, and privilege of increasing to $100,000. for manufacturing all kinds of building materials.

The Scheidler Machine Works Co., capital $60,000, has been incorporated at Newark, O., by Henry R. Scheidler, Oscar Scheidler, Annie S. Miller, Emma E. Scheidler, Dora Scheidler and Louise S. Collins.

C. O. Brightman and S. T. Lipsey have established machine shops at Georgetown, S. C., and will operate as the Brightman-Lipsey Machine Co.

The Strang Enamel & Stamping Co., capital $100,000, has been incorporated at Bellaire, O., by Thomas L. Strang, John R. Gow, J. Park West, D. T. Anderson and Hunter S. Armstrong.

The Shawd Gas Engine Co., Springfield, O., has been reorganized and reincorporated as the Dayton Gas Engine Co. The plant will be moved to Dayton, Ohio. The officers of the company are: President, C. F. Griffith; vice president, W. F. Bakhus; secretary, H. K. Scott; superintendent, P. F. Penn.

The Toledo Pattern Co., Toledo, has been incorporated with a capital of $10,000. The incorporators are: F. E. Calkins, S. P. Bowles, G. K. Detwiler, John W. Taft and Frank W. Bisbee.

The Illinois Machine & Foundry Co., Chicago, has increased its capital stock from $50,000 to $125,000.

The Crescent Forge & Shovel Co., Havana, Ill., has been incorporated with a capital of $45,000.

The M. N. Moorman, Jr., Co., Paneher, W. Va., has been incorporated to carry on a general construction and contracting business. Capital $25,000.

The Wilson Fishing & Drilling Tool Co., Mannington, W. Va., capital $5,000, has been incorporated to buy, sell, manufacture and repair all kinds of fishing and drilling tools.

The Rapid Heater Co., Grand Rapids, Mich., has been incorporated, and will succeed the Climax Boiler Co. in the manufacture of the porcupine type of heater for hot water and steam heating apparatus. The company has a capitalization of $50,000. For the last year the Climax Co. has been manufacturing and placing the heater upon the market, and has met with such success that it was deemed advisable to reorganize with increased capital.

The Ford City Foundry & Machine Co., Ford City, Pa., has been incorporated with a capital of $200,000. The directors are: B. Heiner, Abraham Greenbaum, Samuel Runyon, E. F. McGivern, of Kittanning, and W. G. Smith, of Pittsburg.

The Chicago Metal Covering Co., Chicago, capital $25,000, has been incorporated to manufacture metal coverings.

Larson, Carpenter & Co., contemplate engaging in the machine business at Hallock, Minn.

Hasse Bros. are establishing a plant for the manufacture of gasoline engines at Colman, S. D.

The American Brass Pipe Co., of Connellsville, Pa., has been incorporated in Pennsylvania with a capital stock of $500,000. Of the capital stock $250,000 is 7 per cent cumulative preferred and $250,000 common. There will be a bond issue of $100,000. The company will engage in the manufacture of soil pipe and brass fittings.

Bids are requested by Loup Creek Colliery Co. for construction of 500 beehive ovens staked out on lower Loup creek, Fayette county, West Virginia. For information apply to F. P. Mills, Robson, W. Va.

Baker, Stillwell & Hart, Birmingham, Ala., want prices on second-hand 25-horsepower side-crank engine and 35-horsepower return tubular boiler.

The Southern Structural Steel Co., with capital of $100,000, has been incorporated at San Antonio, Texas, for manufacture of structural steel, by D. F. Youngblood, J. A. Youngblood, W. M. Cornett and others.

The Bamberg Iron Works, Bamberg, S. C., wants 24 x 24-inch by five-foot second-hand iron planer.

The Southern Foundry Co., Owensboro, Ky., wants power punch to punch up to one-half-inch holes in one-quarter-inch stuff, splitting shear, capacity one-half-inch plates, cut-off saw and rip saw.

The Schwarz System Brick Co., 8-10 Bridge street, New York, is in the market for thirty 125-horsepower boilers, twenty-five 100-horsepower engines, electric motors, shafting, belting, elevating and conveying machinery, vacuum pumps, crushers and pulverizers for lime, dump cars, wheelbarrows, brick tray cars, rails, transfer cars, turntables, etc.

The Rawl Coal & Coke Co., Bluefield, W. Va., wants 80-horsepower engine and boiler.

The Foster Machine Co., Chicago, has changed its name to the Foster-Kimball Machine Co., and increased its capital from $4,000 to $10,000.

Darby's Kansas City Boiler Works, Kansas City, Mo., capital $10,000, has been incorporated.

The North East Steel Casting Mfg. Co., Kittery, Me., has been incorporated with a capital of $250,000, of which $1,000 is paid in. The president is A. G. Lundin; treasurer, E. A. Lindstrom, both of Boston, Mass.

The Michigan Sprocket Chain Co., Detroit, has been incorporated with a capital of $25,000.

The list of tools required for the Meadow shops of the Pennsylvania Railroad are expected within a short time, and machine and repair shops of the Lehigh Valley Railroad at Sayre, Pa., are soon to be doubled in size. A portion of the equipment for the latter has already been purchased, but there is still a large quantity to be bought.

Therwedo & Warning have established a plant at Oshkosh, Wis., for the manufacture of galvanized iron, fancy cornices, metal ceilings, etc. The firm went to Oshkosh recently from Manitowoc.

The Arnold Co., Norwalk, Conn., capital $50,000, has been organized to operate a foundry business.

The L. J. Wing Mfg. Co., New York, capital $25,000, has been incorporated to manufacture machinery. The directors are: L. J. Wing, of East Orange, N. J., L. E. Clark, of Jersey City, and F. B. Pierce, of New York.

The Eureka Foundry Co., Rochester, N. Y., capital $25,000, has been incorporated.

Fires and Accidents:—

The Terrell Iron Foundry, T. Abbott & Sons owners, Terrell, Texas, was burned May 7. Loss $10,000; no insurance.

The pattern shop of the Bradford Machine Tool Co., Cincinnati, was destroyed by fire May 10. Loss $5,000.

New Construction:—

B. F. Avery & Sons, plow manufacturers, Louisville, Ky., will increase capital from $582,000 to $1,400,000 and enlarge plant.

The Northwestern Steam Boiler Works, Louisville, Ky., will begin at once rebuilding its plant recently destroyed by fire.

The Marshall Car Wheel & Foundry Co., Marshall, Texas, is enlarging by erection of additional brick building 50 x 75 feet.

The Huntsville Foundry & Machine Works, Huntsville, Tenn., will erect an addition at an early date.

Owing to the demand for its universal patternmakers' and toolmakers' vises, the Emmert Mfg. Co., Waynesboro, Pa., will again increase its facilities. The company is now engaged in

building a two-story structure, 40 x 65 feet, and a one-story building 45 x 125 feet for additional shop room. The company expects to be in the market soon for a complete line of machinery supplies for the equipping of these new shops.

The Traverse City Iron Works, Traverse City, Mich., recently destroyed by fire, will be rebuilt and the new plant will be about double the size of the old one.

The Michigan Steam Pump & Mfg. Co., Trenton, Mich., will erect a plant for the manufacture of high pressure pumps. The first building to be erected will be 50 x 125 feet.

The Toledo Castings Co., Toledo, Ohio, has had plans prepared for the erection of a pattern shop which will be fire proof throughout.

The Milwaukee Bridge Co., Milwaukee, Wis., has acquired 17 acres of land just inside of the northwest city limits on the Northern division of the C. M. & St. P. Railway, and now has under construction a shop 130 x 300 feet, steel frame, brick walls, with separate buildings for office and power house. The shop will be equipped with electric traveling cranes and all modern bridge shop machinery electrically driven. Power will consist of a 150-horsepower high-speed engine direct connected to 100-k. w. generator. All structural material is now on the ground, orders for most of the machinery have been placed and the company expects to commence operations in about 60 days.

The American Foundry Co., Columbus, Ind., was organized by stockholders of the Reeves Pulley Co., and Geo. C. Batton, of that city, who will have charge of the manufacturing end of the business. The foundry is put up for the purpose of taking care of the Reeves Pulley Co.'s foundry work primarily, and will probably not do any outside work soon. Its officers are: M. T. Reeves, president; M. O. Reeves, vice president; G. L. Reeves, secretary and treasurer. The Reeves Pulley Co. is now constructing a building which the American Foundry Co. will lease. This building is on the pulley company's ground and adjacent to its iron working department, which department is employed in the manufacture of the Reeves variable speed transmission and the Reeves wood split pulley clutch.

The Battle Creek Gasoline Engine Co., Battle Creek, Mich., capitalized at $250,000, with $40,000 paid in, will build a plant on which work will be commenced as soon as a site has been secured.

The Gendron Wheel Co., Toledo, O., is having plans prepared for an addition which will consist of a warehouse and storage room, six stories, 40 x 90 feet; estimated cost is $35,000.

D. D. Connor, receiver of the M. Zier Boiler Co., New Albany, Ind., has sold the boiler works to F. H. Beeman and Herman Joseph, of Louisville, for $11,500. It is understood that the purchasers will continue to operate the plant in New Albany.

The Eastern Steel Foundry Co., recently incorporated with a capital of $1,800,000, will locate its plant on the ground formerly owned by the Cruson Iron Co., of Eddystone, Pa. The executive and general offices of the company will be located at the works at Eddystone. The output of the plant will be 2,800 tons of castings per month, running in size from 5 to 150,000 pounds. W. F. Watson, formerly of the American Steel Casting Co., of Chester, is the sales agent of the company.

The Sterlingworth Railway Supply Co. has let the contract for an extension to its foundry plant at Easton, Pa., where malleable iron castings will be made. The company is not in the market for equipment at present.

The Fairbanks Construction Co., Marion, O., has just commenced the construction of its new plant which will be occupied about the first of November. The making of steam shovels will be begun soon after that date.

The Sessions Foundry Co., Bristol, Conn., is building a small addition to its foundry for core making. The foundry is now 630 x 110 feet and the addition will be 50 x 60 feet, one story. The company is now very busy, melting upwards of 100 tons of iron per day, all in jobbing work.

About June 1 the Lidgerwood Manufacturing Co. expects to have plans ready for its new plant at Newark, N. J. The foundry and power house will be the first buildings to be erected, for which 250-horsepower engines and boilers will be required.

Large shops for the construction of steam and electric cars will shortly be erected by T. H. Buckley, of Worcester, Mass., on a tract of land adjoining the property of the Graton & Knight Manufacturing Co.

The Blake & Knowles steam pump works of the International Steam Pump Co., of New York, contemplate spending between $200,000 and $300,000 in improvements at their plant at Cambridge, Mass. Several machine tools and new boilers for heating purposes will be purchased, but the requirement for machinery will not be large.

The George A. Hogg Iron & Steel Foundry Co., Pittsburg, has about closed the options for 25 acres of ground at Rosslyn Station, on the Panhandle and Pittsburg, Chartiers & Youghiogheny railroads where it is the intention to build one of the largest and most complete iron and steel foundries in the country. The plans for the new work have all been completed and bids will be received and the contracts let in a short time. The new plant, when built and equipped, will have cost about $500,000, and at the start will employ 800 men. The old plant of the company will be dismantled, and all the serviceable machinery will be transferred to Rosslyn Station. A description of the proposed plant has already appeared in these columns.

General Industrial Notes:—

The Baldwin Locomotive Works, of Philadelphia, Pa., have made shipment of two heavy freight locomotives to China.

The Holthoff Machinery Co., of Cudahy, Wis., has lately obtained orders from Mexican and South American points.

The Lunkenheimer Co., Cincinnati, reports that on account of the unprecedented demand for its brass and iron steam specialties, it has been compelled to increase its foundry output 50 per cent. Machine tools of the most improved type are being installed in various departments as fast as they can be obtained.

The Alabama & Georgia Iron Co. has blown in its Cherokee furnace at Cedartown, Ga. The plant has been repaired and improved.

The Champion Iron Co., Kenton, O., is now occupying its new plant, which is a decided improvement on the plant destroyed by fire a few months ago. The company, immediately after the fire, acquired a site of 25 acres on which it started to build for the purpose of manufacturing the company's specialties, jails, structural and ornamental iron work, gray-iron castings, fencings, etc. The buildings are of steel and brick, equipped with electric motor-driven machinery, electric cranes and every modern contrivance that will facilitate construction and reduce cost. The buildings are: main shop, 110 x 300 feet, with a gallery on either side 30 x 300 feet; foundry, 100 x 180 feet; pattern building, 40 x 100 feet, three stories; power plant, 44 x 82 feet; blacksmith building, 40 x 65 feet; stock building, 60 x 100 feet, and the office building.

The creditors of Aultman, Miller & Co., Akron, O., manufacturers of mowers and reapers, decided at a recent meeting to appoint a committee of seven men who will make an effort to have the affairs of the company taken out of bankruptcy court with the purpose of reorganizing the company and continuing the business.

The new plant of the Fort Worth Machine & Foundry Co., Fort Worth, Texas, was opened for business a few days ago.

Fires have been lighted at the new steel plant of the Alan Wood Iron & Steel Co., Norristown, Pa. Ground was broken in November, 1901, but active building operations were not started until the spring following, since which time rapid progress has been made. The plant has seven open-hearth furnaces.

The new furnace of the Low Moor Iron Co., of Low Moor, Va., will be blown in about July 1. The company now has in operation two furnaces at Low Moor and one at Covington, in the same county; total capacity, 90,000 gross tons. The new furnace is 90 x 19 feet.

At the annual meeting of the stockholders of the Struthers Furnace Co., of Struthers, O., held at the main office at Cleveland, the following directors were elected for the ensuing year: W. C. Runyon, J. B. Stubbs, A. Grossman, Geo. L. Fairbank and S. A. Richards. The directors elected the following officers: W. C. Runyon, president; J. B. Stubbs, vice president; A. Grossman, treasurer; Geo. L. Fairbank, secretary; S. A. Richards, manager; David Tod, manager cement department.